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ABSTRACT

Since 1987 Hezel Associates has documented statewide activities in educational telecommunications and distance learning. This is the seventh edition in the series of reports. The analysis reports on telecommunications and distance learning initiatives primarily; however, it also describes the broader technology initiatives that encompass many of the telecommunications and distance learning programs. The first section, "An Overview of Educational Telecommunications and Distance Learning in the United States," provides a summary of trends and also points to particular technology development events in states. The State-by-State section contains a description for each of the 50 states. Each state description is divided into multiple sections. "Relevant Background and Brief History of the Current Programs" highlights new activities since publication of the 1996 report. "The State's Current Situation and Climate Regarding Distance Learning and Educational Technology" gives the reader the latest information about important planning groups, the forces that are driving educational technology development, and the current plans in place or in the making within the state information resources agency, the higher education agency, and the state agency. In addition, the section includes information about E-rate activities, funding, and major technology and network initiatives in the states. A new section offers comments and conclusions about activities in the state. Contains a glossary of interstate educational telecommunications providers and a glossary of terms. (AEF)

EDUCATIONAL TELECOMMUNICATIONS AND DISTANCE LEARNING

THE STATE-BY-STATE ANALYSIS 1998-99

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Hezel Associates is dedicated to the intelligent development of telecommunications and media resources through planning and research. With 30 years experience in education, media, and telecommunications management and research, Hezel Associates has gained a distinguished national reputation as a leading expert in telecommunications policy. Our services include: Market studies and needs assessments for telemedicine and education products and programs; evaluation of telemedicine educational technology projects; consultation on management and policy issues in telemedicine and educational telecommunications; preparation of strategic and business plans for telemedicine and distance education providers.

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A Report by Hezel Associates

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ACKNOWLEDGMENTS

For this, the seventh edition of *Educational Telecommunications and Distance Learning: The State-by-State Analysis*, Hezel Associates offers gratitude to many individuals. Although the first edition, published in 1987 under a contract with the Annenberg/CPB Project, was entirely the product of my research and writing, the 1998-99 edition involved more nearly a dozen staff and associates. Most centrally, Paula Szulc Dominguez, our senior research associate, bringing her usual high standards of quality to the research and writing, organized the campaign to finish the report. Unflinchingly, researchers Laurie Kenyon and Jun Hwa Lee pursued information sometimes difficult to obtain, tracked down contacts for their feedback, and wrote well. Paul Hezel and Mick VanVranken did much of the early web searching and initial contacting of state representatives. Gail Bouverat, our proofreader, made sure our punctuation was in the right place, our spelling was correct, and the sentences were full with meaning. Deborah Vriesenga designed and set the inside pages, and Jerry Russell designed the cover and title pages.

At the office, our staff, Nader Nanjiani, Project Manager, and Stefanie Kubanka and Bernadette Soto, Project Coordinators, carried a full slate of our main line research, planning, and consulting projects, even while this report was occupying so much attention of other staff.

We are especially grateful to the many individuals in the states who provided their time and assistance with information in response to our questions. Many of those state contacts have been helping us since the first edition in 1987. The state contacts patiently told us about new initiatives, policies, technology, and funding that we could never have found through websites or printed material. Then they reviewed what we had written about their state to make sure we were correctly representing the state. I appreciate their help year after year.

Finally, I extend gratitude to my wife, Janice O'Neil Hezel, and my children, Julia and Nathan, who have supported—or at least endured—my attention to this report, our clients, and the business of Hezel Associates.

Richard T. Hezel
President
Hezel Associates

PREFACE

Since 1987 Hezel Associates has documented statewide activities in educational telecommunications and distance learning. *Educational Telecommunications and Distance Learning: The State-by-State Analysis, 1998-99* is the seventh edition in the series of reports. The title of the report has been changed slightly to acknowledge the key function of distance learning in the use of telecommunications. Besides, we had been following distance learning very closely for years.

In this analysis, Hezel Associates reports on telecommunications and distance learning initiatives primarily; in addition, however, we describe the broader technology initiatives that encompass many of the telecommunications and distance learning programs. We prefer to use the term "educational technology and telecommunications" to reflect the broad spectrum of activity taking place in schools, institutions, and state agencies. When we write about specific states and institutions, however, we use the terminology that the state or institution itself employs. Therefore, in some cases our descriptions of initiatives mention "information technology" planning efforts and "distance learning" projects, while at other times, we describe "distance education." Our report reflects the fact that there is no standard vocabulary used to describe the use of technology to aid education. It's nearly impossible to separate one from the other, and instructional delivery takes many forms and uses various technologies anyway.

The analysis is our way of keeping our subscribers up to date on changes in the technology environment as it affects education delivery in each state. As you will see by reading the report, the changes from year to year are numerous, and this report is newly written from beginning to end.

The report is intended to inform readers about trends in educational telecommunications, technology, and distance learning. The first section, "An Overview of Educational Telecommunications and Distance Learning in the USA" provides a summary of trends we have observed through collecting data from many sources. The overview also points to particular technology development events in states.

The State by State section contains a description for each of the 50 states. Each state description is divided into multiple sections, and previous subscribers will note some reorganization within state reports. "Relevant Background and Brief History of the Current Programs" highlights activities since we published the 1996 report. This section includes information that will help you understand the context for current technology events in the state. The section "The State's Current Situation and Climate Regarding Distance Learning and Educational Technology" gives the reader the latest information about important planning groups, the forces that are driving educational technology development, and the current plans in place or in the making within the state information resources agency, the higher education agency, and the state education agency. In addition, the section includes information about E-rate activities, funding, and major technology and network initiatives in the state. Finally, we have added a new section, "Hezel Associates' Comments and Conclusions," which offers the reader our analysis of activities in the state.

Readers who work in educational institutions or state agencies will find those descriptions valuable in comparing activities in other states with their own activities and in searching for models of good telecommunications practice and policy. Other readers who represent telecommunications and technology suppliers will find that their marketing activities and research can be guided by the state descriptions. For example, states involved in planning and funding of educational telecommunications are generally better prepared to invest in technology and are appropriate targets of marketing efforts, while states that have conducted little or no planning and have no funding are unlikely candidates for development in the near future.

If you have very limited time to read the report, do read the "Overview" and the executive summary of each state. Those will give you a flavor for the status of technology in the USA as a whole as well as the individual states.

The report data come to us through various methods. Since 1987 Hezel Associates has maintained a library of documents about telecommunications in every state. Our consulting and research activities in more than 25 states have given us greater familiarity with telecommunications projects and the people who organize them. To acquire up-to-date information, we searched the web and contacted by telephone and email nearly 500 individuals across the country in elementary, secondary, and higher education; public broadcasting; and state agencies for technology and telecommunications. After we had drafted each state's analysis, we emailed or faxed the draft to at least three of our contacts in each state to obtain their feedback and corrections.

As always, we welcome feedback from readers about the report. We will be happy to help you maximize your use of the valuable information. Please let us know how we can be helpful to you in your planning, research, and market analysis.

Educational Telecommunications and Distance Learning:
The State-by-State Analysis 1998-99

An Overview of Educational Telecommunications and Distance Learning

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AN OVERVIEW OF EDUCATIONAL TELECOMMUNICATIONS AND DISTANCE LEARNING IN THE USA

INTRODUCTION

As the close of the century approaches, education institutions at all levels are embracing technology for administrative and instructional uses. Several years ago, a school or university with sufficient equipment and a well developed plan for technology implementation served as a model for others to emulate. Today, it is rare to find any educational setting without a short- and long-term technology plan and at least one computer center or other technology initiative in place.

What has fueled developments in educational technology and telecommunications? A combination of state level and local level efforts contribute to the growing presence of technology in education settings. Since the early and mid-1990's, states have devoted time and energy to create statewide telecommunications networks. Perhaps more than any other factor, these statewide networks have enabled educators to experience tremendous technological maturation. Certainly, the physical connections among K-12 schools, postsecondary institutions, and state network backbones have made possible diverse technology projects. Just as important, however, is the fact that the development of statewide telecommunications infrastructures has required that educators participate in collaborative discussions with representatives from other sectors, including state agencies, private industry, public safety, and the military. As educators take part in such broad-based deliberations, they have been able to make important contacts and embark on creative partnerships.

Simultaneous with the development of statewide infrastructures for educational technology has been a fundamental shift at the local level in the acknowledgment of technology's right and proper role in education. In the past, many teachers, faculty members, and administrators have voiced doubts about the benefits of using technology. Equipment, local networks, and other capital and operating costs were perceived as expensive bells and whistles that detracted from the "real" resources educators and students needed. Although healthy skepticism still exists today, it takes place against a larger context where technology is identified as a key aspect of a state's strategic education plan and as a critical tool to facilitate an institution's ability to reach more students.

What new directions and common concerns have emerged amidst the growth in educational telecommunications and technology? This Overview section of *Educational Telecommunications and Distance Learning: The State-by-State Analysis, 1998-99* focuses on the key trends in education technology planning and implementation that have taken place at K-12 and postsecondary levels.

LEADERSHIP AND GOVERNANCE IN TELECOMMUNICATIONS DEVELOPMENT

This report was initially prepared in 1987 to examine the leadership, collaboration, governance, and coordination of telecommunications at the state level. Underlying the first report was the hypothesis that the better the coordination taking place, the more likely the development of useful telecommunications infrastructures for education. Again and again, this hypothesis has been supported: better planning, coordination, and management lead to better, longer lasting educational technology-based solutions.

Why has Hezel Associates taken the state level as the unit of analysis? Statewide telecommunications planning and development have been at the heart of this and prior reports for several sound reasons. First, most network development takes place in and is coordinated by state agencies. Second, education generally operates within state boundaries and is subject to state agencies. Educational technology and telecommunications efforts tend to serve the mission and needs of those state agencies and the institutions they represent. Third, educational technology projects that have exerted the most impact typically are observed at the state level. Fourth, investment in the development of telecommunications infrastructure is a state-subsidized concern, not a federal government matter. Finally, states have become major supporters of the use of technology and telecommunications in schools.

Based on data from its 1987 report, one of Hezel Associates' first observations was that leadership from state governors was critical to the development of telecommunications infrastructures for state agencies and education. This assertion is no less true today. Most governors have recognized the inherent link between telecommunications and information technology and a state's competitiveness and economic well being. The thriving educational technology initiatives in states including North Carolina and New Jersey can be attributed to a large part to strong gubernatorial leadership. Today, only a few governors have failed to prioritize telecommunications development.

Legislative support travels hand-in-hand with the development of educational technology and telecommunications, as Hezel Associates' series of reports have documented. In 1987, when Hezel Associates began tracking funding and policy leadership, only a few states, such as Indiana, Virginia, California and North Dakota, offered information technology initiatives for education. California continues to set the pace for legislative support today, and Texas offers another fine example of the tremendous difference exerted by the policies identified and funding provided by state legislatures. Without exception, state legislatures across the country have deliberated technology-related issues, ranging from the definition of distance education to strategic planning for information technology.

To aid governors and state legislatures in assembling resources for educators, a variety of state agencies have assumed the responsibility for coordinating statewide technology planning and implementation. Over the past two years, states including Utah and Wyoming have created the new position of Chief Information Officer (CIO) to oversee technology planning. In general, CIO positions exist in states in which information technology boards and commissions take the lead in supervising the planning and design of information systems. Alternatively, states such as Louisiana and Georgia have charged the administrative division of telecommunications departments with facilitating statewide technology planning. These organizations usually assist in collaborative planning and development of high speed, high bandwidth digital networks for intrastate and interstate communication. In several states, including South Dakota, information technology and telecommunications planning occur under the guidance of a single state agency. On occasion, despite the presence of state agencies invested with the responsibility of statewide information technology planning, a dominant university system has established its own network independent from the coordinating authority.

To summarize, statewide educational technology initiatives thrive or flounder for very real reasons. A state's educational technology planning usually take place against the larger framework for statewide telecommunications and technology. When educational technology initiatives succeed, it is usually because governors and state legislatures have provided the leadership and resources necessary to foster growth, while centralized planning agencies have created a system for the overall coordination of efforts. The converse is also true: when statewide educational technology initiatives fail, it is often because no one entity, agency, or office (the governor, office of information technology, department of administrative services, etc.) has identified technology and telecommunications as a priority issue for the state. Without a supportive environment, even the most well conceived educational technology projects have to struggle.

CHANGING MODELS OF COORDINATION

Hezel Associates has followed with great interest trends in the statewide coordination of planning for educational technology and telecommunications. When Hezel Associates began its study of statewide coordination in 1987, the delineators were readily evident: it was easy to detect which states "had" or "did not have" statewide planning efforts underway. Moreover, characterizing which direction planning originated, either from the "top down" or the "bottom up," was also relatively simple.

Today, however, these distinctions are less clear and not as useful. To some degree, all states today house "statewide" planning efforts which center around educational technology and telecommunications. In a few cases, such as Iowa and Utah, specific agencies have been charged with developing statewide educational applications. But "statewide" initiatives may also emerge as the sum of planning efforts stemming from a number of locales—within a university system, among all the regional educational agencies, or in all school districts. Further, the "top down" vs. "bottom up" distinction has limited meaning in places where a dual approach is underway. States like Maine and Pennsylvania, for example, are among those that have worked diligently to combine state oversight with local control.

A more accurate representation of statewide planning for educational technology and telecommunications today is as a continuum, which ranges from "tightly organized" to "highly decentralized." This model acknowledges that even the most underfunded state that lacks critical personnel is nonetheless engaged in planning. Moreover, it reflects the fact that the combined efforts of grass roots organizations and state level leadership can lead to a supportive environment for educational technology and telecommunications.

TECHNOLOGY AS TOOL

The use of technology in education settings, especially in K-12 schools, has typically involved limited interpretations. Technology has been portrayed as an end unto itself, as evident in the scrupulous attention paid to statistics such as computer-to-student ratios and percentage of schools connected to the Internet. Discussions of "technology in schools" have usually focused on purely instructional applications. Into the late 1990s, however, increased emphasis has been directed at technology's other roles in education settings. More and more, technology is being characterized as a tool to assist educators in three important ways: as a means to redress inequities, as a tool to support statewide subject area standards, and as a way to facilitate administration and disseminate public information.

Technology was first seen as a means to address educational inequities in 1990, when Kentucky recognized that technology could be used to deliver quality education to all children in the state. Kentucky's efforts to integrate technology into its education reform efforts led to the inception of a fine statewide system for educational technology and telecommunications. A more recent spate of equity-related lawsuits and judgments facing K-12 education systems throughout the country also point to technology's preeminence in assisting reform. States including Illinois and Wyoming have determined that the funding mechanisms for K-12 education are unconstitutional and lead to inequitable access to technologies across school districts, exacerbating the gap between technology "have" and "have nots." In response, states have developed long- range technology plans and grants targeting the needs of poor school districts. For many states, access to technology has become synonymous with access to greater educational opportunities for traditionally disenfranchised students.

Technology now appears as a tool in state standards initiatives. It is the rare state today that has not articulated standards of learning in content areas such as math, science, and history. In states like Virginia, there are specific technology standards that students must master in order to graduate. In other states, technology per se is not a content area for students to learn, but rather is used to facilitate student learning in the content areas. Students are not the only educational audience that must concern themselves with technology knowledge. States such as Idaho and North Dakota have identified a number of technology competencies teachers must display as part of certification and recertification. It appears, then, that states are becoming more concerned with establishing minimum requirements to prepare both students and teachers to interact in today's technological settings.

Many states have prioritized administrative applications for technology. Two broad patterns of administrative use can be detected. First, technology helps schools, school districts, state agencies, and institutions of higher education in states like Ohio share information more easily. Electronic student records, financial information, and test results lead to streamlined and cost efficient communication. Second, the schoolwide data collection can be shared with parents and other concerned citizens as a means to assess school performance. States including Delaware and Michigan have invested in developing databases that enable statewide comparisons of schools and school districts. Technology in this situation exists as a means to support school accountability.

THE INTEGRATION OF TECHNOLOGY IN EDUCATION

More than ever before, good planning is leading to a true integration of technology in learning; technology is not just an add-on to education. Not only can this phenomenon be observed in state plans tying technology to curriculum and standards, but also in colleges' and universities' plans for technology. Many postsecondary institutions have reorganized their electronic resources under an information office, which combines academic and administrative computing, network services, and media services. At the same time, those universities are developing distance learning offices that coordinate all distance learning efforts of the university and market the programs.

Most important in the reorganization is the recognition that the programmatic development remains with the faculty, wherever they might be located, and that technology serves learners wherever they might be located—whether in the classroom with the teacher, in the dorm rooms on campus, at home or work in the local community, on another campus, or anywhere in the USA or in the world. As a result, "distance learning" is becoming more difficult to distinguish from "technology based learning."

A GROWING FEDERAL INFLUENCE

In the past, the federal government has maintained a relatively low profile in encouraging the development of educational technology and telecommunications. Over the past three years, however, its influence on statewide initiatives has become more tangible, especially within K-12 settings. The incentive for schools and institutions to attend to federal technology and telecommunications directives can be summarized in one word: funding.

The most revolutionary system for funding school technology, especially telecommunications, has come in the form of the E-rate. The E-rate permits schools and libraries to obtain discounts on telecommunications services and some equipment, and the level of the discount for any school or consortium depends on the poverty or affluence of the district, as measured by the percentage of aidable students. A special provision of the Telecommunications Act of 1996, the E-rate stems from the Federal Communications Commission's longstanding universal service rules, which have provided a fund to support telecommunications services at reasonable rates for senior citizens and for rural residents. Although there have been challenges to the E-rate, notably by SBC (formerly Southwestern Bell), and although the management of the application process has experienced first-time glitches, it appears that the nearly $2 billion fund is ready for disbursement to states, consortia, and individual schools.

The E-rate will have produced other salutary effects on school technology development, in addition to the windfall funding for educational telecommunications. In their applications for the E-rate, schools are required to demonstrate their technology plans, and for the first time many schools, districts, and even states have developed strategies and committed them to writing.

Several initiatives of the US Department of Education have stimulated the perfusion of technology in schools. Goals 2000 funding is designed, in part, to enable the integration of technology into the establishment and attainment of content standards. Technology Literacy Challenge grants have enabled states to create their own coordinated technology plans and to oversee the development of school district and school technology plans. Requiring schools to have their own technology plans in place in order to qualify for subgrants can be tricky, however. Schools that have the least resources are the ones least likely to be able to devote time and effort to putting together a technology plan. Some states have addressed this by making technology planning funds available to schools in poor school districts. Professional development and Internet access are the most widely supported applications of TLCF grants.

The US Department of Education also funds the Star Schools program. Now 10 years old, the Star Schools program has supported the development of educational programs in math, science and foreign language for delivery via telecommunications, initially satellite and later fiber optics. In the 1997 funding, however, the Star Schools program funded the development of instructional resources to be delivered by the Internet and by CD-ROM.

At the higher education level, one of the most crucial funding mechanisms comes through the Higher Education Reauthorization Act, through which funds are allocated for subsidized student loans and grants. Congress continues to withhold full support for college students who obtain courses and degrees via distance education.

THE WEB AND DISTANCE EDUCATION

Without doubt, over the last three years the availability of the World Wide Web has changed fundamentally thinking about distance learning. The Internet has not only offered a new technology of distribution, but it has also changed the potential market, the content, and even the pedagogical framework for the delivery of instruction. The issue on the collective planning agendas of postsecondary institutions is the use of the Internet and World Wide Web to reach more students. In community college systems, private colleges and universities, and state university settings, administrators and faculty members are working to integrate the Internet into their distance education efforts. Almost all institutions of higher education are using the Internet and World Wide Web as a means to supplement campus-based instruction to some extent. In many cases, faculty members have developed modules or courses that rely entirely on the Internet. A still more limited number of institutions have offered entire degree programs through the Internet.

"Virtual universities" epitomize the potential of the Internet for higher education. An institutionalized means of bringing instruction to learners at anytime and anyplace, virtual universities have changed the face of higher education marketing. In an attempt to keep up with the competition, many universities have put courses on the Web. Many others are developing full-scale virtual universities, which are simply outreach or distance learning divisions of the university.

In a few states, like California, Kentucky, Pennsylvania, and Texas, statewide virtual universities are emerging. California is noteworthy, not only because the state snubbed its neighbor states by not joining the Western Governors University, but also because the California Virtual University offers courses from the University of California; California State University, and the California Community Colleges. On the other coast, in New York the SUNY Learning Network, whose administrators avoid the term "virtual," has grown to 37 campuses and 6000 students participating annually in just three years.

On the broadest level, regional virtual universities like the Western Governors University (WGU) have made a significant impact on higher education. The goal of WGU is to meet the needs for easy access to affordable, practical education in the fields of study that are in demand. WGU offers distance learning courses from dozens of universities and corporations to the learners, wherever they are located. These courses use technology from the Internet to satellite to the postal service, to provide different options for receiving an affordable education.

WGU's impact has been palpable: The early marketing attempts reveal an eager potential student body of learners who have the interest in programs that are currently not available in their region—learners who are not available to travel to, and live in, the far-away city where the program is offered. The effect of WGU is also observable at traditional colleges: administrators at smaller colleges are expressing deep concern about their institutions' longevity in the face of an institution such as WGU. In response, those colleges are beginning, as never before, to review their strengths, weaknesses and opportunities, and to develop and refine the niches for their colleges.

The Southern Regional Electronic Campus (SREC), a service of the Southern Regional Education Board, has expanded its "commonwealth" to all 15 states in its service area, which comprises the southeastern states. SREC is a marketplace for courses and programs offered by colleges and universities through electronic methods. Unlike WGU, SREC has not established a new accredited college, but offers an opportunity for students to take courses electronically and transfer the credits to any participating institution.

All of the "virtual" institutions face common challenges in serving their student clientele: market research, faculty training, and student services. Market research becomes a more pressing need as the institutions attempt to offer services that extend well beyond community or state boundaries for delivery via the Internet. If courses are to be offered via distance learning, faculty need to be trained in the use of technology for course design and management. Some universities are training hundreds of faculty each semester. Along with course material, on-line students need resources that are typically available to on-campus learners, such as advising, financial aid, and especially library services.

The availability of the Internet has changed K-12 school priorities. Much of the enthusiasm for distance learning, particularly interactive video, in the early '90s temporarily evaporated with the overwhelming focus on "getting the Internet" into the schools. A large proportion of technology spending in schools has supported links to the Internet, in-school wiring, and computers to access the Internet in each classroom. Purchasing content for the schools is a second priority, and staff training is a third, but growing, priority. It is expected that interest in distance learning will return after schools have completed their Internet connections, both internally and externally.

In the next few years the focus on technology building will be overtaken by a focus on the development and acquisition of content. Already there is evidence of content publishers making substantial investments in the development of non-print materials to be delivered on the Internet and on CD-ROM, in more than just an extension of printed textbooks. Indeed, some corporations envision themselves as partners with accredited postsecondary institutions, which will offer the software as the course, much as PBS for years has offered telecourses in league with community colleges in the USA.

THE NATIONALIZATION AND INTERNATIONALIZATION OF DISTANCE LEARNING

Distance learning can't be stopped at borders—state or national. State higher education commissions that place geographic boundaries on colleges in state actually impede the potential of those in-state colleges to compete with out of state providers. States like Maryland and California are struggling with geographical restrictions on community colleges and state universities at a time when the University of Phoenix and Stanford University have no such restrictions.

Whereas public institutions have been established to serve their community or state constituencies, like private colleges, they now envision new revenues, and even profitability, in delivering their specialized programs out of state or out of country. The last two years have seen a gaggle of higher education administrators flying in all directions to establish foreign offices, especially in Asia, at least prior to the 1998 slump there. Unarguably, the United States, with the most extensive, most widely available higher education system in the world, is a target destination for students in many foreign nations. US institutions are seeking to make that education system available at sites around the world. Just as the Internet has made education available across state lines, it will permit colleges to serve the international market.

The State-by-State Analysis

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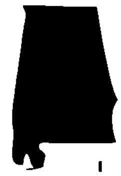
ACRONYMS AND NETWORKS

- ACHE—Alabama Commission on Higher Education
- ACS—Alabama College System/ Department of Postsecondary Education
- ADECA—Alabama Department of Economic and Community Affairs
- AREN—Alabama Research and Education Network
- ASA—Alabama Supercomputer Authority
- AU—Auburn University
- IITS—Instructional Interactive Telecommunications System
- OTI—Office of Technology Initiatives, under SDE
- SDE—State Department of Education
- UA—University of Alabama
- UAB—University of Alabama– Birmingham
- UAH—University of Alabama–Huntsville
- UAS—University of Alabama System



EXECUTIVE SUMMARY OF THE STATE

Alabama's distance learning, telecommunications, and technology planning consist of independently organized efforts. State plans for investment in educational technology and the development of a statewide educational network that makes use of the existing Alabama Research and Education Network (AREN) languished during the 1997 legislature. After some back and forth efforts to finally reach an agreement, the legislative session ended without action. Legislative issues in 1998 have focused on general infrastructure effort for K-12, and are not likely to produce legislation and funding specifically for technology efforts.

The Alabama Commission on Higher Education uses the SREB Electronic Campus (SREC) as a focal point in its distance learning coordination and policy making. The SREC will act as the filter for validating the quality of distance courses in Alabama. The Alabama College System, consisting mostly of public two-year schools in Alabama, is in the process of creating a technology plan for the system. Efforts are underway to bring the institutions together to operate more effectively, which will alter the pattern of independent operations that has characterized the colleges over the past several years.

IITS, the dedicated compressed video network serving higher education, K-12, and state government need continues to grow and expand. AREN will expand its backbone bandwidth and upgrade to ATM technology.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The Alabama Supercomputer Authority (ASA) is a public corporation responsible for the operation of the Alabama Research and Education Network. At first, ASA focused on serving only higher education's data connectivity needs. Now the highest demand for connectivity over this network occurs in the K-12 and two-year college sectors. The IITS network began as an initiative of the University of Alabama System. Originally, there were 17 sites on that compressed video network. State funding was not received for the development of the IITS network.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Alabama Department of Economic and Community Affairs (ADECA)***

The Alabama Department of Economic and Community Affairs (ADECA) is the state's planning agency for five areas: health care, government agencies, libraries, education, and business and economic development. The Science, Technology and Energy Division is in the process of preparing a state plan for telecommunications in education and telemedicine, with the goal of establishing a statewide fiber voice, data, and video network that supports full motion video. ADECA's approach is to build a system based on the needs and desires of the teachers, principals, administrators, and county-wide distance learning coordinators. It has implemented local systems in two counties, and plans are in place to expand into two more counties in the coming year. ADECA also provides training on the use of technology in instruction.

■ ***Information Services Division (ISD)***

An April 1997 merger of the Department of Finance's Telecommunication Division and the Data Systems Management Division created the Information Services Division (ISD). ISD plays no direct role in educational technology planning and infrastructure effort, nor is education served over the state's frame relay network. The Alabama Supercomputer Authority (ASA) serves educational data connectivity needs, an independent public corporation. The ASA is funded through the Alabama Education Trust Fund and contracts for services over Alabama Research and Education Network (AREN).

■ ***Alabama Commission on Higher Education (ACHE)***

The Alabama Commission on Higher Education (ACHE) is the state agency responsible for the overall statewide planning and coordination of the 12 four-year and 30 two-year higher education institutions in Alabama, the administration of various student aid programs, and the performance of designated regulatory functions. Oversight of public institutions includes the three institutions of the University of Alabama System and the Alabama College System. ACHE holds regulatory authority for new courses and programs, as well as for courses delivered off campus. ACHE uses the Southern Regional Education Board's (SREB) Electronic Campus framework, principles of good practice, and distribution capability as the primary means of overseeing distance education efforts and quality in the state.

■ ***State Department of Education***

The Office of Technology Initiatives (OTI) within the State Department of Education (SDE) serves as the single point of central technology coordination for the K-12 sector. The SDE assumed primary responsibility for developing the *Alabama Technology Plan for K-12 Education*, in conjunction with the Governor's Council on Education Technology. Funding requests to carry out some of the recommendations of the plan, however, did not carry through the 1997 legislature. Facing a severe lack of state funds for technology projects, the OTI has focused its efforts on making the most effective use of federal money it received from the Goals 2000 and the Technology Literacy Challenge Fund programs. The OTI has also been coordinating training efforts and serving as the information conduit for the application and use of federal funds.

In 1995, an inequity lawsuit resulted in a reorganization of the distribution of educational funding. The Foundation Program and the *1995 Accountability Act* transferred accountability and quality oversight to the local school districts.

■ ***Alabama College System***

A new chancellor of the Alabama College System is attempting to redesign the system that loosely oversees the operation of the 31 institutions—composed of 30 community, junior, and technical colleges and one baccalaureate institution—to operate more effectively as a single, cohesive entity. The system is in the process of merging campuses, and reports to the State Board of Education.

A committee was formed in early 1998 with the goal of creating a technology plan for the postsecondary college system. Compiling a technology survey of the system served as the first order of the committee's business. The System is working with instructional officers at the colleges to determine how distance education will make learning more effective. A common course directory already exists, which sets the stage for developing a similar initiative through distance learning, although no policies specifically relate to distance learning.

THE DRIVING FORCE

Activities stemming from Governor Fob James office have frustrated recent statewide technology initiatives. Although the Alabama Department of Economic and Community Affairs (ADECA) serves, as the state's planning agency, there has not been a single, powerful voice to coordinate distance education, which has resulted in the disjointed distance education initiatives apparent throughout the state.

THE PLANS

■ ***Expansion of Alabama Research and Education Network***

Two major initiatives involve the AREN network. First, its bandwidth is expanding from multiple T-1 to T-3 using ATM switching. Second, as a result of a February 1998 National Science Foundation (NSF) grant, AREN participates in NSF's vBNS project, in cooperation with the universities in Alabama.

AREN and the Alabama Supercomputer Authority have submitted a proposal to the National Science Foundation to help establish video services on the network that would integrate organizations served by AREN and also the IITS video network run out of the University of Alabama. These services would be run on the T-3 ATM backbone.

■ ***Alabama Commission on Higher Education***

ACHE is working closely with the Southern Regional Electronic Campus (SREC) and the institutions in Alabama to develop 100 courses and three full degree programs to be offered through the SREC in the fall of 1998. The SREC is providing the framework around which Alabama can develop its distance learning programs. A virtual library for the state eventually will help provide library services for SREC students. A budget request of $3 million is associated with this project, which will provide online databases for students.

ACHE is in the process of redefining the regulation of distance learning courses to align with the Southern Regional Electronic Campus' policies. The SREC's "principles of good practice" and its approval system will assure the quality of courses, without further regulation from the ACHE. The SREC will also provide the resources necessary to meet educational needs within the state. Courses that have been pre-approved by ACHE can then be offered electronically. ACHE is also trying to modify the tuition and fee structure pertaining to courses taken out-of-state via electronic means. Rather than subject students to the out-of-state tuition rates, ACHE is seeking to allow schools to apply fees as the market allows.

ACHE has also approved the shared program concept, to encourage the delivery of unique and needed programs throughout the state on an economical basis. Through the policies it articulates, ACHE is assuming a role to encourage and improve access to educational opportunities throughout the state.

■ ***K-12***

The State Board of Education adopted the *Alabama Technology Plan for K-12 Education* in February 1997. The plan called for a phased approach to bringing technology into the schools, and the establishment of a statewide educational network that would expand and extend the reaches of AREN to include all K-12, postsecondary, and higher education institutions. Phase I included NetDay efforts to help bring initial LAN infrastructure into each of the schools and school districts. Phase II called for the completion of the LANs, beginning the statewide network for K-12, postsecondary, and higher education, and also hardware purchases. A bond issue was proposed to finance the Phase II expenditures. Although eliminating the purchase of computers reduced the original request of $165 million to $125 million, the effort was still defeated in the legislature. An agreement was reached for $35 million among the State Department of Education, Department of Finance; Governor's Office, and other involved parties, but was never considered as it was presented too late in the legislative session.

In the 1998 legislative session, the joint proposal was not reconsidered, and the legislature will act instead upon a request to fund comprehensive facilities infrastructure through a $500 million bond proposal. Technology infrastructure will receive some attention through this initiative, but a separate initiative for technology will not be considered.

The State Department of Education has pooled Goals 2000 and Technology Literacy Challenge Fund grants and made them available for schools to invest in infrastructure and training. K-12 sites on the IITS compressed video network has been coordinated by the SDE. The network has been used for training in conjunction with host universities, and its long term goal is to use the network to create a shared partnership between K-12 and the universities.

■ ***E-rate***

Individual school districts are responsible for submitting their own applications for E-rate funds. The SDE is coordinating efforts for information dissemination to place the schools in the best possible position to apply for the Technology Literacy Challenge Fund and Goals 2000 fund.

THE FUNDING SOURCES

■ ***K-12***

The State Department of Education has received $19.7 million in Goals 2000 funds since 1995, and another $7.6 million is expected for the 1998-99 school year. The Technology Literacy Challenge Fund has been supported for a total of $10.2 million over the two years.

TECHNOLOGY

■ ***Alabama Research and Education Network***

The AREN network, run by the Alabama Supercomputer Authority, primarily serves K-12, community colleges, and universities for direct, high speed connections to the Internet over its multiple T-1 backbone. Growth on the network has occurred rapidly in the K-12 and community college sectors. Sites can connect via T-1, 56 Kbps, ISDN, CDS, or dial-up to the TCP/IP network. Approximately 33 percent of the K-12 schools are connected through AREN to the Internet. The goal is to connect all K-12 schools to AREN by June 1999. The state runs a different network for its state agencies, but uses AREN only for its Internet gateway services. The Alabama Supercomputer Authority is also involved in Internet2 efforts as an affiliate member.

■ ***IITS***

The IITS interactive video system was originally sponsored by the University of Alabama System. This compressed video network across dedicated T-1 lines has now branched out to include 36 organizations as of March 1998, and continues to expand. The network is primarily used by higher education for graduate level instruction, but is also used by K-12 schools, two-year schools of the Alabama College System, four-year institutions, and other state agencies. A consortium of the institutions administers the network, with centralized operation at the University of Alabama System offices.

■ ***Satellite***

All 67 counties in the state have satellite downlinks. The Cooperative Extension System, which includes UAH, Tuskeegee, Alabama A&M, and Auburn Universities, makes extensive use of the satellite network for staff development, content programming, and continuing education for professionals. Auburn University has Ku- and C-band uplinking capabilities.

■ ***University of Alabama System***

Each of the three institutions of the University of Alabama System is operated independently. Among the System institutions, the University of Alabama has the most extensive distance learning program. The University of Alabama (UA) supports five delivery methods for distance education. First, independent study for undergraduate courses accounts for 7200 enrollments per semester. Second, QUEST, the videotape delivery program, offers approximately 100 courses per year. Third, compressed video courses over the IITS system number approximately 50 per year. Fourth, UA also delivers approximately 12 courses per year through National Technological University. Finally, GOALS, the online delivery program started in July 1997, boasts six online courses currently with another 12 in development. There are six master's level engineering degrees offered through the QUEST program and another in rehabilitation management delivered through the IITS system. Residency requirements for graduate study currently inhibit the development of more degree programs through distance learning.

■ ***Auburn University***

The president of Auburn University asked the institution's Distance Learning Committee to chart a course for the future philosophy, approach, and activity in distance learning and deliver a plan by the end of April 1998. A distance learning mission will be established, and active involvement with the K-12 sector will be encouraged. The University will partner with K-12 schools to strengthen the ability of teachers to deal with technology, as well as offer guidance to teachers in certain subject areas such as mathematics. The focus is not on the technology, as it is assumed that some technology will be there to support efforts. Rather, the emphasis is on how to serve educational needs and priorities. Auburn University's Engineering College was the first to make a concerted effort to use distance learning as a means of instruction. Efforts are also underway to integrate the computer and the World Wide Web as a real part of the university's educational curriculum.

Some of the colleges in the institution have developed their own programs. Internet activity is generating more interest, though courses are also offered by compressed video, as well as audio conferencing, satellite, videotape, and other means. Auburn offers over 200 credit courses per year to over 1400 students. This represents 5500 quarter hours, a six percent increase over the previous year. Most of these courses are offered within Alabama. An additional 112 non-credit programs for professional development reach over 2200 people, generating over 25,000 contact hours, a four percent increase over the previous year.

Auburn University's distance education efforts have centered on several areas: The College of Engineering and the College of Business both offer master's degree programs by videotape. A graduate program for professionals in Adult Basic Education is also offered by videotape. There are over 250 students in the degree programs, with over one-half of the students enrolled in the MBA program. Fewer than 10 courses per semester use the IITS compressed video network. Efforts are underway to develop undergraduate engineering programs, an area which has large demand.

■ ***Collaborative Efforts***

Materials Engineering and Nursing offer degree programs in collaboration with University of Alabama-Birmingham. Jefferson State Community College has a program with Dauphin College for the delivery of a two-way audio and video degree program in occupational therapy. Calhoun Community College in Decatur has a pilot course on the Southern Regional Electronic Campus, and they are expected to participate in the SREC activities.

■ ***K-12***

The Alabama Department of Economic and Community Affairs has established two county-based, five site fiber voice, data, and full motion video networks in high schools, with plans to begin two more in the coming year. The networks have been used by the high schools to provide advanced instruction in subjects not normally offered at the participating schools. Support for this activity comes in the form of grants provided by the Appalachia Regional Commission, the US Department of Agriculture, and the Rural Utilities Service. Internet connectivity for K-12 schools is primarily accessed through the AREN network. Approximately 33 percent of schools in Alabama access AREN through dedicated 56 Kbps, T-1, and dial-up lines.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Although technology and telecommunications planning efforts are currently disjointed in Alabama, there is no lack of distance education initiatives in the state. A number of entities separately offer their own solid ideas and infrastructures for statewide telecommunications and technology. The Alabama Department of Economic and Community Affairs strives to plan a statewide, fiber based network to serve the state's educational and telemedicine needs. The State Department of Education, meanwhile, has advanced a technology plan for K-12 education that would involve compressed video. The University of Alabama offers an IITS compressed video network. The Alabama Supercomputer Authority's AREN network will soon expand its reach even further, with the possibility of eventually including the university's IITS. The Information Services Division operates its own government agency telecommunications infrastructure. Amidst the wealth of technology and the jostling crowd of distance education providers, there is certainly room for consolidation and compromise. As lessons from other states demonstrate, Alabama stands to gain improved performance, financial returns, and a better infrastructure if the now-diverse array of distance education entities can create a united vision for Alabama's educational telecommunications and technologies.

ALASKA

ACRONYMS AND NETWORKS

- APBC—Alaska Public Broadcasting Commission
- APUC—Alaska Public Utilities Commission
- ARCS—Alaska Rural Communications Service
- ASTF—Alaska Science and Technology Foundation
- ATN—Alaska Teleconferencing Network
- DAS—Department of Administrative Services
- DDC—Distance Delivery Consortium
- OASIS—On-Line Alaska School Information System
- SIP—Satellite Interconnection Program
- SLED—Statewide Library Electronic Doorway
- TIC—Telecommunications Information Council
- UACN—University of Alaska Computer Network

EXECUTIVE SUMMARY OF THE STATE

In an attempt to overcome the vast distances separating Alaska's residents, various state agencies have come together to consolidate their communications efforts. The governor's office and the state legislature have provided the leadership and financial support necessary to bring technology to the forefront of issues facing the state, not only for education-related issues, but for government and economic concerns, as well. Through collaborative efforts, Alaska's state agencies have developed multiple technology plans that support a cohesive state network, as well as individual technology plans that focus on using the network. Unique to Alaska's departmental activities is the fact that they involve community input. The University of Alaska's networking initiatives, K-12 technology projects, and state government plans all incorporate community contributions as decisions are made concerning connectivity, training, and development, for the purpose of increasing opportunities for lifelong learning and creating an educated public.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

In September 1994, the Alaska Public Utilities Commission (APUC) launched Alaska 2001, an inquiry into the future of telecommunications policy in Alaska. The APUC's goal was to assess the role of regulation and to begin the process of formulating a strategic telecommunications policy for the benefit of all Alaskans.

To help accomplish this goal the APUC established four task forces, which eventually included the participation of 200 volunteers, to research issues and prepare policy proposals for public presentation in four broad areas of telecommunications: competition and regulation, universal service, government use and provision of telecommunications services, and economic development. The 12-member Advisory Committee synthesized the task forces' work into a final report, which outlined policy recommendations in each of the four task force areas directed to the legislature, the governor, the APUC, and other state agencies. The Alaska 2001 Plan established the framework for subsequent telecommunications planning initiatives by other state agencies and organizations, including those efforts by the Telecommunications Information Council (TIC) and the Alaska Public Broadcasting Association.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Telecommunications Information Council (TIC)***

The Telecommunications Information Council (TIC), established in 1992 has the authority to set policy on state government's voice, video, and data systems. With that governance role, the TIC and its various subcommittees also assume responsibility for communicating with the private sector, the federal government, and local governments on issues relating to development of the telecommunications infrastructure to meet the state's needs. The TIC is also charged with the responsibility to formulate and adopt the Alaska Telecommunications and Information Technology Plan. The TIC is chaired by the lieutenant governor and consists of 29 members who represent the state assembly, state senate, executive offices, the public sector, and several state agencies, including the Department of Education and the Department of Information Services.

■ ***Alaska Department of Education (DOE)***

The Alaska Department of Education focuses its efforts on training, development, and integrating technology into classroom curricula, instead of on issues involving connectivity or equipment. The Alaska DOE's philosophy reflects a belief that significant state and federal resources are directed at developing LANs and WANs for schools, but that not enough resources target training and development. The Alaska DOE's technology activities also center on parental awareness of technology, and on involving the community more in training.

■ ***Alaska Public Broadcasting Commission (APBC)***

The Alaska Public Broadcasting Commission is responsible for the planning and development of the state's public broadcast system for education, entertainment, and communications. The APBC encourages and oversees the development of an integrated public broadcasting system for the state and coordinates activities of all public broadcasting stations. APBC also allocates and administers operating and capital grants to locally controlled nonprofit broadcasting stations or telecommunications entities to support the delivery of non-commercial programs intended for general audiences. The nine-member, governor appointed commission is located in the Department of Administration.

■ ***University of Alaska System***

The University of Alaska consists of 13 campuses throughout the state and enrolls approximately 20,000 students. The system's major campuses are located in Anchorage, Fairbanks, and Juneau. Centers for distance education exist on all three main campuses and are involved in a university-wide planning effort to enhance the delivery of higher education programs throughout the state.

■ ***Distance Delivery Consortium***

Based in Bethel, Alaska, the Distance Delivery Consortium is a non-profit organization that provides instructional programming to 52 villages in the Yukon-Kuskokwim Delta of western Alaska, the interior of Alaska, and southeast Alaska. The consortium includes four school districts, regional public radio and television stations, the Alaska National Guard, and several telecommunications providers.

THE DRIVING FORCE

Alaska's technology and telecommunications planning has benefited from the participation of the state's lieutenant governor, Fran Ulmer, who has chaired the state's Telecommunications Council and Alaska 2001 Task Force. Her championing the development of a better statewide communications infrastructure has led to increased legislative support and community involvement.

THE PLANS

■ ***Telecommunications Information Council (TIC)***

In December 1996, the TIC adopted *Alaska's Telecommunications and Information Technology Plan*. The plan resulted from the work of eight internal task forces which considered the following issues: economic development, public telecommunications, emergency communications, telemedicine, the *Telecommunications Act of 1996*, public transactions, education, and management of information systems and data processing. The plan represented the state government's portion of the Alaska 2001 plan, which was approved by the Alaska Public Utilities Commission (APUC) in March 1996 and attempted to articulate the needs of Alaska's citizens. The plan described almost one hundred recommendations and objectives; one of the state's key conclusions was that a partnership effort between the state and public telecommunications providers would best meet the needs of Alaska's citizenry. According to the TIC's report, the state should be a stimulator of public telecommunications by serving as an anchor tenant in order to encourage the development of advanced telecommunications technologies; should stimulate as well as facilitate private-sector telecommunications efforts; and should be pro-active and pro-competition. Particularly with regard to education, the TIC recommended that the state should encourage partnership development for the purposes of information sharing, coordination, needs assessment, demonstration, and evaluation of statewide projects. The TIC's plan recommended high speed, switched, broadband telecommunications capability in every school, library, and educational facility in the state by the year 2000. To date, the state has completed 70 of the approximately 90 recommendations outlined in the plan.

■ ***K-12***

The Alaska Department of Education has been pursuing the implementation of standards articulated in its 1996 Alaska Quality Schools Initiative. The initiative focuses on four primary areas: student academics and assessment; professional standards of the academic staff; support from family, community, and business networks; and schools and government. The integration of technology is fundamental to standards in all four areas. According to the Alaska DOE, by approaching technology as a tool for supporting academic development, alternative learning opportunities for students are discovered.

The Alaska DOE is also working on the On-line Alaska School Information System (OASIS) project, which will establish and maintain a cost effective, secure method of accessing and transferring school and critical student-level shared information. The OASIS project will allow the Alaska DOE to establish compatible data standards and a process for local education agencies to electronically share school data in a timely and cost effective manner; establish an automated process for local education agencies to share school data with the state to more efficiently meet state and federal reporting requirements; and improve the accessibility and usefulness of information for educational research and evaluation purposes. Phase I of the OASIS Project was completed during the spring of 1998. During this time, Alaska DOE and district pilots worked with the integration team to install computer-based systems and procedures to enable effective student record management at both the local and state levels.

■ ***E-rate***

The state government and Alaska Department of Education established the Technology Certification Committee to administer the Universal Service Funds at the state level. The committee approved a total of 33 school districts and 15 libraries to seek the federal discount.

■ ***University of Alaska***

The University of Alaska system administers the Educational Technology Program, which provides educators, administrators, and education specialists with opportunities to develop instructional and technical expertise in educational technology. The program enables students to develop their skills in computer use and to use the technology to support and enhance teaching, learning, and administration. Since the program began in 1983, 2,000 students have completed it. The program is currently undergoing revision, and its master's degree is no longer being offered. The restructuring will move the center from Juneau to Anchorage and permit bachelor's degree students to enroll, as well. One new area the program is exploring is the development of a technology program for parents.

■ ***Alaska Public Broadcasting Commission***

The Satellite Interconnection Project is a satellite distribution system designed to help reduce Alaska's public broadcasting operating costs by encouraging cooperation among stations, improving networking, and reducing overhead. The SIP originated from recent restructuring activities at APBC, which called for greater system-wide leadership and financial oversight among all stations on the system. The SIP has TV uplinks in Anchorage, Bethel, Fairbanks, and Juneau, and public radio uplinks are in the works for several rural locations. Conversion from analog wave to digital technology accommodates additional channels on the same amount of satellite space once occupied by only one channel. The SIP now allows APBC to deliver the Emergency Alert System, Alaska One TV, gavel to gavel legislature coverage, the Alaska Three Educational Channel, and public radio stations. Future plans include adding a data feature that will enable computer-assisted mentoring between instructors and students on SIP's ALASKA THREE channel, utilizing the system's MPEG technology to deliver asynchronous distance learning courses, and promoting telemedicine applications.

THE FUNDING SOURCES

■ *K-12*

Schools in the state have received technology grants through the Alaska Science and Technology Foundation (ASTF), which strives to foster and promote the growth of Alaska's public health, telecommunications, scientific, and engineering capabilities. Grants of $5,000 are awarded to teachers to promote the understanding of science, math, and statistics in Alaska, and usually support Internet connectivity. In 1996 and 1997, the ASTF began offering Interconnectivity Grants to help link Alaska's schools to the Internet. To date, the ASTF has provided over $3.3 million in funding for routers and wiring needed to connect 336 schools in the state. These funds have been supplemented with $4.8 million in cash and in-kind contributions from the schools and communities. The ASTF is expected to award an additional $1.5 million in Interconnectivity Grants, which translates into $10,000 per school for hardware-related expenses.

The Alaska Department of Education does not request funds for any specific training and development initiative, nor does it provide money for hardware or equipment.

■ *Alaska Public Broadcasting*

ALASKA THREE, the latest SIP educational network, was funded through a $500,000 grant from the National Telecommunications Information Administration's Public Telecommunications Facilities Program (PTFP). The grant money purchased two digital encoders to convert the satellite programming offered by the Distance Delivery Consortium from analog to digital. The grant also allowed the purchase of 74 compressed digital receivers, which were placed at college campuses and school districts.

The Alaska Rural Communications Service's (ARCS) line item in the budget is dedicated entirely to paying the majority of the $1.5 million SIP transponder lease cost to AT&T. The ARCS line item covers $1.1 million ($350,000 of which was transferred to it from APBC), while KTOO contributes $300,000 of private funds, and the University contributes, based on use, $100,000.

TECHNOLOGY

■ K-12

Schools in the state's oil-rich North Slope Borough area are connected to a high speed network which allows two-way video and Internet access. The North Slope Borough School District, which covers 90,000 square miles and includes 10 schools, capitalized on the wealth of its oil fields and purchased a satellite transponder. The satellite delivers programming to 11 interactive digital videoconferencing sites in seven villages.

■ Alaska Public Broadcasting

The Satellite Interconnection Project (SIP) interconnects Alaska's emergency communications, distance education, television and radio using digital compression over four networks, ALASKA ONE, ALASKA TWO, ALASKA THREE, and ALASKA FOUR. ALASKA ONE provides 16 hours of educational programming per day. ALASKA TWO, which is modeled after C-Span, provides coverage of the Alaska Legislature. ALASKA THREE, which in June of 1997 was the latest to come on-line, is a distance education channel that provides K-12 and higher education programming. The University of Alaska-Fairbanks supplies college courses for higher education, while the Distance Delivery Consortium, a non-profit organization head-quartered in Bethe,l provides K-12 courses. Regular PBS programming is offered over ALASKA FOUR, the Alaska Rural Communications Service (ARCS), formerly the Rural Alaska Television Network (RATNet). In addition to delivering public broadcast and education programs, SIP also provides the only statewide Emergency Alert System in Alaska.

■ State Library Electronic Doorway (SLED)

The State Library Electronic Doorway (SLED) is a computer system that provides users with access to a wide variety of information about government, business, reference materials, education, and Internet research tools. Users access SLED by means of a computer and modem. For 80 percent or more of the state's population, access is free by dialing a local access number, part of Alascom's Alaskanet service. Users outside of larger communities must pay a long distance charge to access SLED.

■ University of Alaska (UA)

The thirteen campuses of the University of Alaska system are connected through a frame relay system, which provides satellite-delivered instruction. Campuses in Anchorage, Fairbanks, and Juneau have fiber optic connections, but connections to the smaller campus communities are still 56 Kbps or 128 Kbps. Five T-1 lines connect Anchorage and Fairbanks to the continental United States, three to Anchorage and two to Fairbanks. Approximately 93 percent of the student population receives its Internet service from the University of Alaska system, although this proportion is expected to erode as more private carriers emerge.

The University of Alaska system operates a videoconferencing system on behalf of state agencies. The V-Tel equipment connects the three main campuses, and in March 1998 it was connected with the rest of the country. Although the main user of the videoconferencing system is the state government, educators may make more use of the university's audio conference system, which has been successfully employed as part of classroom instruction, administration, and counseling.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Similar to the situation in many states, Alaska's telecommunications infrastructure employs a wide range of technology and involves varying degrees of quality. The disparities are marked. More populated areas of the state have access to high speed, high bandwidth services, whereas rural communities often are lucky to have twisted pair technology. Oil rich remote areas such as the North Slope own their own digital satellite transponder and prove their own interactive programming. Both the Alaska Department of Education and the state's rural schools were looking at Universal Service Funds as a means to bring together the state's disparate communities, and with the cutbacks in the programs will have to seek other ways to connect the state.

ARIZONA

ACRONYMS AND NETWORKS

- ADE—Arizona Department of Education
- ALS—Arizona Learning Service
- ASSET—Arizona School Services through Education Technology
- ASU—Arizona State University
- ATIC—Arizona Telecommunications and Information Council
- Project EAGLE—Education and Government Linking Electronically
- GITA—Government Information Technology Agency
- ITAC—Information Technology Authorization Committee
- NAU—Northern Arizona University
- TPO—Telecommunications Policy Office

EXECUTIVE SUMMARY OF THE STATE

Most of Arizona's distance learning activity centers on statewide attempts to coordinate telecommunications planning and individual efforts put forth by institutions of higher learning. Recent legislation created the Government Information Technology Agency, a new state agency responsible for strategic telecommunications planning. Note, however, that the Telecommunications Policy Office, a separate state agency out of the governor's office, had all of its positions vacant in March 1998.

Project EAGLE-Education and Government Linking Electronically, sought to coordinate the telecommunications needs of state government and education under a single statewide program of infrastructure development. Individual RFPs were brought together from the state government, the community colleges' Arizona Learning System, and the three state universities. Because the bids on this RFP did not meet the requirements in December 1997, the state finds itself without movement toward a statewide, aggregated technology and telecommunications infrastructure. As of March 1998, Project EAGLE's future remained unclear. In the interim, the state will be looking to establish more limited scope contracts for specialized telecommunications services.

Northern Arizona University's unique telecommunications distribution system makes use of available microwave resources. Statewide infrastructure does not exist that would encourage collaboration.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Arizona's statewide leadership in educational telecommunications and technology has shifted over the past several years. The Department of Administration, which formerly had a voice in planning educational technology, is no longer active. New state level entities include the Government Information Technology Agency and the Governor's Telecommunications Policy Office. These entities do not have jurisdiction over the universities or community colleges. The lack of continuity in statewide leadership may be one reason that Arizona has developed a wealth of independent technology planning efforts, initiatives, and networks, and has fallen behind other states in centralized planning.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Government Information Technology Agency (GITA)***

In 1996, the Arizona state legislature created the Government Information Technology Agency (GITA), which began operations in July 1997. GITA assumes responsibility for statewide strategic information technology planning, coordinating and consulting for the executive agencies. GITA has administered the state government's involvement in Project EAGLE, an attempt to create a single statewide telecommunications infrastructure to serve state government, K-12, and higher education needs. Although GITA is not directly involved with planning and coordination for higher education or K-12 schools, it will make the upcoming statewide telecommunications contract available to those sectors.

■ ***Governor's Telecommunications Policy Office***

The Telecommunications Policy Office, created in July 1995, aims to serve as a single point of contact for telecommunications policy issues in the state, such as E-rate and deregulation. The office's positions are expected to be filled sometime in mid to late 1998.

■ ***Information Technology Authorization Committee (ITAC)***

ITAC is an executive, legislative, judicial, and private sector committee, which has planning and oversight responsibility for information technology in all three branches of state government. The committee also has jurisdiction over the universities and community colleges in Arizona.

■ ***Arizona Department of Education***

Arizona supports local control of school districts and schools. The Arizona Department of Education (ADE) provides leadership and support to the local education agencies in the acquisition of technology, often making use of partnerships such as the Arizona Learning Technology Partnership (ALTP), a coalition of business, government, and education organizations, libraries, and community support groups. The technology goals of the ADE have been delineated in the state plan for a Technology Integrated Educational Delivery System (TIEDS) first developed in 1989.

Centralized efforts at the ADE focus on professional development and finishing the Internet connectivity to the more than 1200 to 2500 school building sites, including charter schools in the state. The ADE includes technology as part of its pre-service requirements for new teachers. The ADE has long provided technology services through its partnership with ASSET-the Arizona School Services through Educational Technology consortium. This service has fulfilled the educational broadcasting needs of the state. Partnerships with NAU, US West, and other groups support technology projects and training.

Board of Regents (BOR)

The Board of Regents (BOR) governs all three public, four-year institutions of higher learning in Arizona: Arizona State University (ASU), University of Arizona (UAz), and Northern Arizona University (NAU). ASU has three campuses and an extended campus, while UAz has one campus. NAU is a rural institution, and has been the most aggressive in pursuing distance learning as a medium of instruction. Each of the universities in Arizona has its own personality and mission. ASU serves the metropolitan Phoenix region, which contains up to 70 percent of the state's population. The focus at UAz is on its identity as a research institution. These factors give some background to the current climate of uneven development of distance learning as a teaching method: NAU has pursued a statewide mission with its network, ASU provides distance learning services locally, and the University of Arizona is only now expanding its offerings in distance education. The institutions have not been on equal footing for distance learning development, nor are the institutions willing to compromise their own resources. Only NAU receives state funds to meet statewide educational needs. Each of the institutions maintains its own territory for delivery of services, including distance learning courses and programs, with exceptions made for specialties or special programs that have been given a statewide mandate. Distance learning courses follow the same approval mechanisms as other courses and programs. The Board of Regents has approved two collaborative distance learning programs.

Arizona Learning Service-Community Colleges

The community college system in Arizona is more divided and autonomous than the BOR system institutions, as each community college has its own locally elected board for governance in addition to the State Board. Eight of the 10 community college districts are rural, and the geographic service areas within them are quite large. Each community college differently prioritizes the development of distance learning, often due as much to the wealth or cyclical funding availability as it is to an educational necessity. Although each community college is governed as a separate institution, all ten community colleges participate in 2+2 programs with the state universities. Community colleges use both the Internet and two-way interactive full motion microwave H.320 video through independent point to point systems.

The Arizona Learning Service (ALS) is a consortium of the 10 community colleges in Arizona, which has been active in developing a distance learning infrastructure for its members. The Project EAGLE setback prevented the establishment of a statewide infrastructure through ALS. Some community college districts make use of NAUnet for their distance learning needs. One ALS-sponsored pilot project centers on World Wide Web courses, and each of the community colleges offers one web-based course. Individual community colleges have compiled distance learning course banks, which number from 20 to 40 courses. Despite this activity, no solid coordination of programs exists among the community colleges.

THE DRIVING FORCE

Creating a statewide telecommunications infrastructure is an item of high priority in the state, and educators will benefit when a plan is eventually articulated and implemented. Without a plan, however, educators at all levels continue to follow their own missions and carry out their own projects, according to their own diverse needs.

THE PLANS

■ Project EAGLE

Project EAGLE (Education and Government Linking Electronically) attempts to create a single statewide telecommunications infrastructure to serve state government, K-12, and higher education needs. RFIs for advanced telecommunications services were issued independently in the latter half of 1996 by the Arizona Learning Service/Tri-Universities (three state universities) and the state government. The two initiatives were combined to create the $250M, seven-year Project EAGLE effort to build a fiber, satellite, and microwave communications network in the state. To this end, an RFP was released in May 1997.

Unfortunately, the Project EAGLE bids received in December 1997 were deemed unacceptable due to technical gaps. The ALS requirements for the system called for video over ATM, though projected usage was not quantified or substantiated. Vendors were unable to fulfill these requirements in a cost-effective manner. An interim solution settled on creating a statewide contract for services from multiple vendors for frame relay, voice, and data services, so that agencies can procure services that fit their needs. Video needs have not been demonstrated yet. Traffic monitoring on the system as it is implemented will help determine future needs for expansion and upgrade. Educational institutions, if they find it cost effective, will be able to use that statewide contract, though they now individually procure their own telecommunications services. In addition, universities have a single procurement for basic distance learning services. However, it is still hoped that the statewide contract will meet E-rate application requirements in 1999.

■ K-12

School financing occupies the Arizona legislature. An inequity suit, which was decided in the fall of 1997, upheld the finding that there were inequities in the capital bond funds routinely made available to school districts. The legislature is developing a minimum funding standard for infrastructure, which would include computers and communications infrastructure, and in doing so, is eliminating the bonding capacity of some local districts. Although proposed, legislative funding for technology allotted on a per-pupil basis was not be passed in the 1998 session.

Arizona is finishing the second of a three-year plan to connect all school buildings via T-1 connections to the Internet. The $2 million per year project passed in 1996 was billed to the legislature to fulfill administrative connectivity needs. Local, state, and federal revenues are being used to complete connectivity of all districts and charter schools. Full connectivity to all school districts is expected by June 1999.

- ***E-rate***

The ADE coordinates and disseminates E-rate information for the 220 school districts and 150 charter schools in Arizona. Each district is responsible for applying for its own E-rate discounts. The ADE approves technology plans for each of the districts and charter schools.

- ***Arizona School Services Through Educational Technology (ASSET)***

ASSET, the Arizona School Services Through Educational Technology, is a consortium of over 100 school districts in Arizona in partnership with the Arizona Department of Education and Arizona State University. ASSET provides instructional services for K-12 through both public television stations in the state. ASSET services include instructional television, distance learning courses, teacher training, development of online components, and assistance in developing district technology plans. Broadcasting is done through the public television stations. Satellite transmissions include their own Ku-band and C-band uplink through KAET-TV. Downlinks reach about 450 buildings in 120 districts, potentially reaching 240,000 students, which represents approximately one-half of the school districts. Funding for ASSET and its programs comes through direct allocation from the legislature, membership fees for joining service offerings, and through grants. The operating budget is $880K per year.

The Arizona Department of Education (ADE) contracts with ASSET to complete two or three projects each year, and also works in partnership with ASSET on other projects. ASSET is looking more toward developing on-line courses and supplemental materials, as well as professional development through on-line resources. The ADE works with other consortia similar to ASSET to better serve the needs of the schools, especially in the area of technology.

- ***Board of Regents***

The Universities and the Board of Regents (BOR) oversee two new projects. First, the Technology Delivered Education Workgroup has been working on collaborative degree programs. A certificate program in international business began in the fall of 1997, and plans for a master's program in engineering have been approved for implementation in the fall of 1998. The Board of Regents' second project is a statewide market study for distance learning that has been undertaken by FMR Associates. The study, the first of its kind in Arizona, will help focus and pave the way for the development of extended education efforts in Arizona.

- ***University of Arizona***

Most of UAz distance learning students come through a National Technical University-offered certificate for Quality and Reliability Engineering. There are also scattered courses offered through satellite and also over NAUnet, utilizing the University of Arizona's three sites on that network. The School of Information Technology and Resources, formerly the School of Library Science, offers an entire master's program via the Internet on a statewide and national scale.

The University of Arizona is organizing to engage more actively in the field of distance learning. There has been no identified area in which the University of Arizona has been given a mission, as done at NAU and ASU, and there has been no central coordination within the University. In addition, graduate residency requirements have impeded the growth of full-fledged programs. The most likely area for distance learning development is the field of education. The University established a faculty development center that will also highlight the best methods for teaching via technology.

■ ***Arizona State University (ASU)***

Arizona State University (ASU), through its College of Extended Learning, offers about 55 courses per semester, not including independent study. Distance education through ASU is primarily locally delivered by ITFS. Five classroom studios provide settings for these productions. Approximately 12 courses are offered over the World Wide Web, two via CD-ROM, three through public television, and the rest over ITFS. Some of the courses are concurrently offered over cable, satellite, compressed video (limited), and microwave two-way interactive video through NAUnet. ASU offers a nursing program via distance learning.

■ ***Northern Arizona University***

Northern Arizona University (NAU), through the Office for Teaching Effectiveness, is offering primarily undergraduate courses via distance learning. The mission of the Office for Teaching Effectiveness is to develop programs for and with faculty and relevant units upon (a) traditional, innovative, technological and distance learning, and (b) retention and student access. NAU offers courses to students throughout Arizona, from the Mexican border to the northern point of the Navajo reservation, via NAUNet. NAUNet is a distance learning network that connects statewide classrooms for live, full audio and video interactive classes.

NAU offered 150 courses this year and will offer 200 courses in the following academic year through distance learning. Approximately 10,000 students are currently participating in education via distance learning. Microwave, cable TV, Internet and video deliver distance learning at NAU. NAU has decided to expand its distance learning program by adding more courses on the World Wide Web. Presently, there are about 20 courses on the web and by the end of this summer, 40 more courses will be added to the fall schedule.

THE FUNDING SOURCES

■ ***K-12***

In the two years of the Technology Literacy Grant Challenge Fund program, Arizona has received a total of $7.4 million. The awards have supported competitive grants for Internet connections and other technology applications in 135 school districts throughout the state.

The Arizona Department of Education anticipates receiving $6.4 million for the third year of the TLCF program, the same amount it received in the previous funding cycle. The focus for the state's 1999 grants will be on professional development Regional Training Partnerships (RTPs) provide $1.25 million per year for five local education agency partners to provide training and services to the 14 counties in Arizona. The project began in June 1998, and is expected to last between three to five years.

Educators in Arizona are eligible to receive a portion of $4 million in education technology funding from the US West foundation. The US West Foundation money will support projects that integrate technology into the classroom and technology professional development. The focus is on programs that serve low-income, rural, and minority populations in the 14 states served by US West, including Arizona. The program was announced in April 1998, and the application deadline was July 15, 1998.

TECHNOLOGY

No statewide-centralized telecommunications infrastructure serves Arizona. NAUNet provides the higher education community with an integrated microwave network to meet voice, video, and data needs, and the Tri-Universities Network.

The Tri-Universities Network, owned by the Board of Regents, is a Picture Tel compressed video, hardwired network with dial-up capabilities. Administrative purposes constitute the majority of network use, but academic departments appear to be relying on the network for their out-of-state connectivity needs. ASU, for example, has a technology transfer program with a university in Mexico City maintained by the Engineering Department. There are five classrooms at ASU, one at NAU, and two at the University of Arizona.

■ NAUNet

NAUNet, operated by Northern Arizona University, is a microwave data, voice, and video network serving 18 active sites. Connections are also maintained to ASU and the University of Arizona campuses. NAU maintains six Interactive Instructional Television classrooms on the main campus in Flagstaff, and two others at the branch campus in Yuma. The system is two-way fully interactive; programming can originate from any of the site locations. Currently a combination of analog and digital, the two-way analog frequencies are licenses for transmission both ways, which enables transmission for voice and data connectivity for all sites.

T-1 lines have recently been incorporated into the switches and router system, enabling a mix of terrestrial and microwave transmission. This has increased the number of sites to 28 locations, including museums, high schools, and a room in the legislature from which hearings are conducted. Before the acquisition of T-1 lines and the integration of services, telecommunications charges at each site were approximately $1000 per month, which included the necessary calls for switching. Now, after integrating all voice, data, and video systems, each endpoint on the system pays a one-time fee of $6500 for the modem and other equipment. Transmission and network maintenance costs are $3 per hour per site. In one district in northern Arizona, 1000 computers use NAUnet for voice, video, and data, including Internet connectivity over 1.864 Mbps circuits.

NAUnet also has a DS-3 line running from Tucson to Phoenix to NAU in Flagstaff. Part of this bandwidth is leased for telemedicine applications. Three analog circuits from NAU to Phoenix on the microwave network are being converted to digital.

NAUNet delivers an average of 70-80 credit classes per semester, with an average of 20 courses per site. There are also over 200 meetings conducted over NAUnet each semester.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Although distance learning activities in the K-12 sector appear to be making some progress in Arizona, the state faces considerable difficulties stemming from the competitive atmosphere encompassing Arizona's universities. Still, there is evidence coming from several directions that a more collaborative environment is in the works. Joint programs and courses are under discussion. The telecommunications directors from the Tri-Universities meet monthly on an informal basis. The Board of Regents is currently offering incentives to support collaborative processes. Although widespread cooperation may be further down the road for Arizona than in other states, the sooner the state's education entities cooperate, the better the services for its students, and the more responsive the system as a whole will be to competition originating in bordering states.

ARKANSAS

ACRONYMS AND NETWORKS

- ADHE—Arkansas Department of Higher Education
- AETN—Arkansas Educational Television Network
- AHECB—Arkansas Higher Education Coordinating Board
- APSCN—Arkansas Public School Computer Network
- IMPAC—Instructional Microcomputer Project

EXECUTIVE SUMMARY OF THE STATE

Distance learning efforts in all of Arkansas' education arenas have taken off considerably over the past several years, with progress in higher education lagging behind the advances seen in K-12 schools. Some of higher education's slower movements can be attributed to recent restructuring. The 1997 legislative session abolished the State Board for Higher Education and replaced it with the Arkansas Higher Education Coordinating Board. Due to the restructuring, higher education efforts have not focused on a centralized development of distance learning in the state, and institutions are still taking charge of their own distance learning initiatives. Through the Association of Two-Year Colleges, two-year institutions have begun development of a Virtual Two-Year College, which will begin offering courses in January 1999. Centralized training of faculty for web-based instruction began in the summer of 1998.

The Department of Higher Education is coordinating the state's participation in the Southern Regional Electronic Campus (SREC), a program of the Southern Regional Education Board, offering credit courses and degree programs by distance learning throughout the 15 southern states.

Another 1997 legislative action, Act 1362, created the Cooperative Education Services Coordinating Council to serve as a coordinating body for the development and implementation of programs and activities for the benefit of educational service cooperatives statewide. Technology was included in these activities, and it is expected that the Cooperative Educational centers will continue to focus their role on meeting the educational technology needs of the K-12 sector.

The statewide Arkansas Public School Computer Network (APSCN) is nearly completed, and will provide Internet access to all K-12 schools through at least a 56 Kbps dedicated connection. The Arkansas Educational Television Network (AETN) received a TIIAP grant from the National Telecommunications and Information Administration to provide professional development services through the implementation of a digital satellite network throughout the state.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Historically, educational telecommunications and technology initiatives in Arkansas have not had the same financial resources available to them, as did other southern states. Moreover, until 1995 or so, high level attention to statewide telecommunications planning had been sporadic. Nonetheless, Arkansas has slowly but steadily built its infrastructure and created pockets of support for educational telecommunications and technology. The IMPAC Learning Systems is a true veteran of Arkansas' attempts to create a technology rich environment for schools.

IMPAC Learning System is operating under the State Department of Education to provide technical and software support. IMPAC has expanded its role as an integral part of providing education via distance learning by implementing various programs. In 1992, IMPAC had recently completed Phase I (1983-1991) of its activities. During Phase I of IMPAC, 473 programs reached 300 Arkansas school districts, including 85 vocational educational programs, 33 satellite-based education projects, and 355 IMPAC basic skills programs.

The success of Phase I had enabled IMPAC to start implementation of Phase II, which included technology-based instructional programs for grades K-8, writing and multimedia projects for grades 9-12, and support services for a variety of technology-based mathematics and science projects. Thus, IMPAC's initiatives grew to include development of multimedia math, science, and social studies courses, and integration on the statewide network for education.

By 1994, the commitment by IMPAC to assist with state and school district planning in the implementation of school technology was prevalent. IMPAC had continued its efforts to implement Phase II and its dedication to participate in a program of computer hardware and software installation. Upgrading of forty schools a year from the state's 269 school districts is another example of their commitment to improve education though technology in Arkansas.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Department of Information Services***

Department of Information Services (DIS) is a state agency that provides specific focus and justification for information initiatives in support of agency goals and objectives. DIS' vision is to serve the people of Arkansas by providing agencies and institutions the most effective and accessible telecommunications and data processing services available. DIS' mission is to ensure the state makes good decisions concerning information technology and that state information technology initiatives are successful.

■ *Arkansas Higher Education Coordinating Board/Arkansas Department of Higher Education*

The Arkansas Higher Education Coordinating Board coordinates the 33 public institutions of higher education, including the five, four-year and three, two-year institutions of the University of Arkansas System. The Department of Higher Education (DHE) serves as staff to the Coordinating Board.

There have been no formalized policies from the Coordinating Board regarding distance learning, although it is an issue that the Board may be dealing with in the near future. Cooperative agreements have been traditionally worked out among participating institutions when working together or offering courses through sites. The funding structure was also changed in 1992-93 to a credit based system, allowing courses delivered through technology to be funded at the same level as other courses. Though there are no formalized incentives for distance learning collaboration, the Coordinating Board and the DHE have encouraged partnerships through a limited number of cooperative grants. A Strategic Plan worked out for all the higher education institutions in 1996 contained some goals for technology, and began to address some of the issues that are to be faced regarding distance education. The reorganization of higher education has prevented any progress from occurring since that time, however.

The Department of Higher Education also coordinates the Southern Regional Electronic Campus (SREC) effort, a 15-state, regional distance education initiative organized in 1997. Arkansas offers 12 distance education courses through SREC. The DHE makes grant funds available to stimulate faculty development of World Wide Web and other technology-aided instructional methods. The web is seen as a way of infusing technology into the curriculum, at on-campus as well as off-campus centers.

■ *Arkansas Association of Two-Year Colleges*

The 20 community and technical colleges in the state, each governed independently under the auspices of the Coordinating Board, have created a consortium called the Arkansas Association of Two-Year Colleges. This association is in the preliminary stages of deciding how to approach distance learning cooperatively, and exploring the possibility of creating a statewide offering of courses by January 1999.

■ *Arkansas Department of Education*

The Arkansas Department of Education (ADE) provides leadership in the development of school district technology and infrastructure plans. The State Board of Education requires that each school district provide copies of its school district technology plan. The ADE recently developed guidelines for the technology plans and an approval process. Arkansas school districts receive technical assistance for developing their telecommunications infrastructure plans from the state's fifteen regional education cooperative technology specialists, school district technology specialists, the Arkansas Public School Computer Network, IMPAC Learning Systems, Inc., and various commercial telecommunications firms.

K-12 use of educational technology in Arkansas is also actively served by planning and activities stemming from the 15 Education Cooperatives, the Arkansas Commission on Microcomputer Instruction, the Arkansas Academy for Leadership Training and School-Based Management, the Arkansas School for Mathematics and Science, Arkansas Math and Science Crusades.

■ ***Arkansas Educational Television Network***

The mission of Arkansas Educational Television Network (AETN) is to offer lifelong opportunities to all Arkansans; to supply instructional programs to Arkansas' schools; to provide programming and services to improve and enhance the lives of Arkansas citizens. AETN's Learning Services states that "AETN is to use appropriate telecommunications technology to assist Arkansas institutions to deliver information and instructions to lifelong learners."

AETN has utilized a variety of telecommunications technologies to deliver instruction, information and training to students, teachers, administrators and school board members. AETN has taken initiatives in putting in place an information highway that blankets the entire state and serves all levels of education. Arkansans are able to earn college credits no matter how remote or isolated they may be, through television courses (telecourses) offered jointly by AETN and the Arkansas Telecommunications Consortium. AETN is also working to support the Association of Two-Year Colleges in the development of their distance learning system and the training of faculty and staff.

■ ***Arkansas Department of Workforce Education***

The Arkansas Department of Workforce Education utilizes federal Carl Perkins funding to support more advanced technology associated with improving occupational programs. Since the Perkins funds cannot be used to upgrade and replace the status quo, the state required that program improvement activities meet specific criteria including but not limited to: ❶ a curriculum change to advanced technology; ❷ the faculty required to be appropriately trained on the new technology and curriculum; ❸ the funds used at the site and/or program with the highest concentration of special populations; and, ❹ the purchase of appropriate instructional equipment for the improved program.

This effort is slowly beginning to move workforce education in Arkansas at the K-12 level toward more advanced technologies to meet the needs of the state's workforce.

■ ***Murphy Commission***

The Murphy Commission, a citizen's commission working to streamline the Arkansas state government, has named its Technology/Telecommunications subcommittee to continue studying the needs and direction for telecommunications in Arkansas. The Murphy Commission will make its report to the Arkansas Legislature and the governor on all aspects of state government and the state telecommunications infrastructure prior to the 1999 legislative sessions. The Technology Committee has formed three subcommittee study groups to make recommendations on various aspects of telecommunications and technology, one of which includes representatives from education.

THE DRIVING FORCE

■ K-12

Unlike the strong, top down planning that stems from the department of education in some states, Arkansas' K-12 technology use is shaped elsewhere. Technology planning and utilization emerges at two levels—at the school district level, and in the 15 Educational Cooperatives. Distance learning and staff development continue to be key considerations in these ongoing technology discussions.

■ Higher Education

The restructuring that recently took place within higher education has temporarily placed a halt on systemwide planning for educational telecommunications and technology. It appears that the institutions' individual needs and efforts will dictate advances over the next year or so. An exception to this is the activity of the Association of Two-Year Colleges, which will concentrate on forming a virtual college to pool resources, address local needs for courses and training, and meet the interests of the new executive director and the presidents of the institutions.

THE PLANS

■ Statewide Legislation

In addition to the 1997 Act 1362, several other recent bills affect the state's educational technology development. The *Telecommunications Regulatory Reform Act of 1997*, passed in February 1997, provides for a system of regulation of telecommunications services consistent with the federal *Telecommunications Act of 1996*. The bill assists in implementing the national policy of opening the telecommunications market to competition on fair and equal terms, modifies outdated regulations, eliminates unnecessary regulation, and preserves and advances universal service.

The General Assembly enacted legislation requiring the Arkansas Department of Education to make use of advanced technology in gathering data from school districts to increase accuracy and timeliness of state-level information and reduce the reporting burden. In support of this directive, the Arkansas Department of Education developed a *Statewide Information System Plan*. Under the plan, all 311 Arkansas school districts will have automated district information systems for local record keeping and state reporting of student, personnel, finance, and program information in place by June 30, 1998.

■ K12

The Arkansas Educational Telecommunications Network (AETN) and the Arkansas Academy for Leadership Training and School-Based Management, motivated by concern for Arkansas students who need consistent, effective exposure to information technologies, are designing an *Electronic Learning Environment*, a program to put additional, well-conceived adoptions of electronic learning technologies on a "fast track" in Arkansas. While many Arkansas educators have embraced telecommunications technologies and techniques, a large population of non-users still exists. Some schools have ventured into the electronic realm with dramatic success, some have met frustration, and many have not made the first move. The two organizations aim to create a technology-rich environment for the Academy's fifteen training institutes; five each for superintendents and CEOs, teams from school districts and other entities, and inservice teachers. Each week-long institute gathers education leaders who are intensively assessing, focusing, collaborating, and learning. By the nature of the institutes' curricula, participants open themselves to new routes toward effectiveness. Considering all of the people involved in education in Arkansas, these institute participants appear to be among the ones most likely to take a new concept home (and "home" is literally all across the state) and put it into effect.

The *Electronic Learning Environment* will strive to replicate a technology rich school and will contain learning areas in combination with specialized areas that meet its curricular needs. The project will be implemented in special purpose modules to be designed around the way people learn. One goal of the *Electronic Learning Environment* is to serve as a model electronic school. The *Electronic Learning Environment's* module areas include technology hub, media center, computer lab, classrooms, television and multimedia production area, teleconference center, and administrative office.

The Ross Foundation in Arkadelphia, Arkansas, has provided grants to develop a procedure through which school districts can address technology and telecommunications planning through a consultant team that comes on-site for a site/program analysis and provides a report to the school administration and technology planning committee. The school prepares for the visit by developing a program, hardware and software, staff development, and infrastructure inventory for the committee. The process, very similar to an accrediting agency study/visitation approach, has been used effectively in Arkadelphia, Sparkman, and Centerpoint school districts using Ross Foundation funds. Hot Springs recently used the Foundation's model to update its technology plan and to develop a district-wide infrastructure plan.

■ ***IMPAC Phase II Projects***

IMPAC Learning Systems, Inc., is nearing completion of the 37 regular IMPAC Phase II projects scheduled for 1997-98 and the 13 school district sponsored projects. This year's IMPAC program has been conducted in cooperation with the state's education service cooperatives and the 37 school districts. Four project options were offered: ❶ a networked managed interactive learning system with multimedia and Internet access capability, ❷ infrastructure plans and their implementation, ❸ library/multimedia, and ❹ classroom presentation technologies.

■ ***E-rate***

The Arkansas Department of Education established guidelines for districts related to the preparation of technology/telecommunications plans and bids to be submitted in connection with the E-rate program. Workshops were conducted at the state level to prepare various technology specialists to assist school districts. Specialists at each education cooperative will be available to assist schools in their region.

The Arkansas Department of Information Services and the Arkansas Public School Computer Network are developing a statewide E-rate proposal. Education Cooperative Consortiums of school districts and individual districts are preparing to participate in the E-rate discount program.

■ ***OURNET Expanded Distance Learning Options***

The Ozarks Unlimited Resources (OUR) Educational Cooperative in Harrison, Arkansas inaugurated service over its OURNET interactive educational television network in the fall of 1995. Designated as the Demonstration Project for Distance Learning in Arkansas by the State Legislature in 1995, the project continues to deliver shared secondary curricula and dual-credit college courses to students in rural schools. The network currently includes twelve secondary classrooms, a classroom at the regional community/technical college, and a classroom at the OUR Cooperative. With over one-half of the member schools in the cooperative region using a distance learning classroom, the cooperative has begun to deliver staff development programming over the network.

The classroom at the cooperative is extensively equipped in order to address its mission of teacher inservice training. In addition to the OURNET classroom at the community college, a connection to the compressed video classroom at the college serves as a gateway for graduate level and enhanced curricula transmitted to the OURNET schools from the statewide higher education and telemedicine network. The cooperative classroom also provides the network connection to the cable television provider, so that network programming can be delivered into the homes in the region over a dedicated channel.

Both analog and digital satellites have been installed at the cooperative to receive professional staff development programming and then disseminate it over the network. The delivery of staff development programming emanating from the cooperative is making a transition from single-site delivery—where participants travel from schools to the cooperative—to electronic delivery of programming to multiple sites during after school hours, thereby reducing the need for substitute teachers and for travel reimbursement.

■ ***Higher Education***

Two initiatives sponsored by the Coordinating Board and the Department of Higher Education (DHE) constitute the most prominent higher education distance education activities in the state. In the early 1990's, a 15-year matching grant fund refocused to provide grants to institutions interested in establishing interactive video technology programs. These funds served as the seed money to establish the University of Arkansas Medical Center master's program and telemedicine network. The DHE also encourages development of world wide web based courses. To this end, the UA Medical Center is developing a prototype course, and the two-year colleges anticipate using that delivery mode as the primary means for their statewide offerings.

■ ***Association of Two-Year Colleges Virtual College Consortium***
In past years, each of the two-year colleges developed its own distance learning program. A fall 1997 presentation to the college presidents underscored the need for collaboration and cooperation among the two year institutions to maximize resource development. The result of these discussions was the Virtual Two-Year College Consortium. A program of the consortium will begin in July 1998 that will centralize training for developing distance learning, approve curricula, and post offerings on a central web server for web based courses within the Association of Two-Year Colleges. Although the initial focus centers on the development of World Wide Web courses and resources, application of the model to other delivery media such as compressed video may come later. The virtual college is scheduled to offer courses beginning in January 1999.

■ ***Arkansas Educational Television Network (AETN) Digital Satellite Network***
The Arkansas Educational Television Network (AETN) recently received a $300,000 TIIAP grant from the U.S. Department of Commerce to better meet the professional development needs of all Arkansans by developing and implementing a statewide digital satellite network. AETN will upgrade its satellite uplink system from analog to digital and establish 25 digital downlink systems to serve as regional community electronic learning centers, so public education students and lifelong learners have adequate and equal access to information and training opportunities. Implementation of this project will provide people living in rural areas of the state the same opportunities for educational and socioeconomic advancement as those living in more affluent, urban environments. The new and improved satellite network will also provide cost savings to the state and its various distance learning providers.

THE FUNDING SOURCES

The Arkansas General Assembly appropriated more than $5.5 million to continue implementation of the statewide network for K-12 education. Governor Mike Huckabee released $6.3 million from the state general improvement fund to establish a new telecommunications center to be shared by the Arkansas Educational Television Network and the University of Central Arkansas.

Arkansas received a $2.1 million grant under the federal Technology Literacy Challenge Fund. One hundred sixty-six school districts applied for the grant monies, and over 40 districts received funding. The grants will be implemented beginning in September 1998. A similar procedure has been followed with the Goals 2000 funds.

The Governor's Telecommunications/Information Technology Advisory Board approved a $406,982 grant for a collaborative project that includes the Lincoln School District, the Arkansas River Valley Consortium, Ozarks Unlimited Resources Cooperative, and the Arkansas Educational Television Network. The projects center on various distance-learning activities. The Governor's Telecommunications Fund provides funds for the Electronic Learning Environment in the amount of $88,000. The 1997 legislature also provided 1997-99 funding for the Arkansas Public School Computer Network (APSCN), the Arkansas Educational Telecommunications Network (AETN), Project IMPAC, and technology projects for schools through the Cooperative Educational Services Coordinating Council.

The proposed 1994-97 investments by Southwestern Bell, under a Public Services Commission stipulation investment order, were recently completed and include: ❶ $114 million to upgrade central offices so the entire state has a digital network; ❷ $54 million to convert all customers to single-party lines; ❸ $22 million to build fiber optic lines, connections to rural communities, and local telephone companies; ❹ $33 million to implement distance learning and telemedicine; and ❺ $8 million to complete 12 fiber parks.

TECHNOLOGY

■ *K-12*

The statewide network infrastructure, which will connect Arkansas' 311 school districts and the approximately 1,500 public school sites with the Arkansas Department of Education, other state agencies, and the Internet, is nearly completed. As of November 1, 1997, 100 percent of district offices and 92 percent of school sites were connected to the statewide network, with at least a 56 Kbps frame relay circuit. All remaining school sites will be connected by June 30, 1998. To accommodate the increased demands for Internet access by public school students and staff, the Department of Information Systems, which manages the statewide network infrastructure put in place a significantly expanded backbone capability in January 1998.

In addition to providing every public school site with Internet access, the Arkansas Public School Computer Network provides every district office and school building with remote access to administrative computing services for local record keeping, state reporting, and electronic student records transfer. Nearly two-thirds of Arkansas districts have completed administrative computing training, and the remaining one-third of the districts will complete their training by June 30, 1998. All school districts will begin automated state reporting to the Arkansas Department of Education as of July 1, 1998. Electronic student records transfer is scheduled to begin as of July 1, 1999.

■ *OURNET*

The advanced digital fiber optic technology supports a fully interactive, full-motion, continuous-view video and audio network integrated with a multimedia computer network. The network can be configured to accommodate simultaneous multiple clusters of up to four sites per cluster. During routine operation of the system, the "export teacher," located in one of the OURNET classrooms at any one of the schools (or at the OUR classroom), operates all cameras in all classrooms from a specially equipped teaching station. The teacher can see full motion video of each classroom on the network (up to four at one time), a feature the teachers insisted upon. Each student position consists of a desktop with a built-in multimedia computer (identical to the teacher's) and a bi-directional microphone.

The Arkansas School for Mathematics and Science (ASMS) currently collaborates with secondary schools in Malvern and Arkadelphia and with Henderson State University by receiving and sending courses via ATM. The school plans to expand the offerings among the institutions networked by ATM.

■ *Higher Education*

No centralized infrastructure in Arkansas supports distance learning or even the scheduling and administration of distance courses. Course offerings must be coordinated individually among the various independently owned and operated sites throughout the state. Informal cooperation and coordination exists among the different institutions for offering joint degrees and administrative services over compressed video.

Almost all of the secondary public institutions now offer courses and seminars via technology, primarily through interactive video to high schools, two-year college campuses, and the Area Health Education Centers. A total of 65 interactive video sites exist in the state, which include both K-12 schools and higher education sites, and more are slated to become operational through the efforts of the state's Department of Education. The University of Arkansas-Fayetteville owns four distance learning classrooms at various locations throughout the state. Other sites in the state exist at University of Arkansas Community College at Hope, Garland Community College, University of Arkansas-Little Rock, and Monticello Vocational Center. The University's Medical Sciences center administers approximately 21 sites on its own network. An additional 12 educational cooperative area sites will be installed by summer 1998.

All of the community colleges in Arkansas participate in some form of distance learning. Six institutions offer PBS courses, and three institutions have their own World Wide Web based courses. Twelve to 14 institutions operate a compressed video network and almost all have satellite downlink capabilities. The institutions anticipate expanding the compressed video network to reach all community colleges in the state, and the downlink capabilities are being expanded in cooperation with AETN.

■ *University of Arkansas-Fayetteville*

The University of Arkansas-Fayetteville focuses its distance education efforts on interactive compressed video, using leased T-1 connections and transmitting at 384 Kbps. There are currently 5-10 courses offered via compressed video per semester, with one bachelor's and four master's degree programs. Graduate level courses compose most of the courses offered. The master's degree program in Human Resources Development is offered in a two-year cycle, and reaches as many as 40 people located at sites throughout the state.

- ***Arkansas State University***

Arkansas State is the only four-year institution in the northeast quadrant of the state, and relies on distance learning to serve the students in that region. Four instructional classrooms are capable of using compressed video. The university works with eight, two-year schools, of which five serve as university centers where students can take upper level courses to obtain bachelor's degrees, and in some cases master's degrees. Three other sites offer credit courses. All of these centers are located within the university's regional service area.

Currently, bachelor's degree programs are available in nursing, accounting and general business, elementary education, and graduate courses in educational administration, elementary education, and agri-business. The university anticipates increasing the number of bachelor's degree programs by as many as three additional programs and by one or two graduate level programs in 1998.

- ***University of Arkansas Medical Sciences Center (UAMS)***

The University of Arkansas Medical Sciences Center operates 21 interactive video sites. The usage of this network for both telemedicine and distance learning applications increased by over 40 percent in the 1996-97 academic year. Nine sites were added to the network over that time period. The network increased rapidly both in size and use since its inception in 1993.

OTHER MISCELLANEOUS BUT RELEVANT INFORMATION

Lincoln Public Schools recently opened a $3.3 million information technology center. Funding for this center originated in a local tax that generated $2.7 million and some additional grants. The center will serve a school district of 1,077 students and a community of 1,500 people.

The Arkansas Society for Technology in Education (ARKSTE) has been formed as an affiliate of the International Society for Technology in Education. The organization will promote the use of technology in education, including assisting with state technology conferences.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Certainly, distance learning in a variety of forms is alive and well throughout education arenas in Arkansas. Compared with other states, Arkansas' one oddity is the lack of distance learning regulatory action taken by its Higher Education Coordinating Board, which has sidestepped such activity because there has not yet been a perceived need for it. Apparently, the Board worries that if it assumes a role as regulator, it may unnecessarily restrict the development of distance learning in Arkansas. Because of the Board's overall support for incentives and the institutions' openness to collaborative and cooperative agreements, distance learning will most likely grow to meet the needs of the Arkansas population, even without the articulation of specific distance learning policies.

CALIFORNIA

ACRONYMS AND NETWORKS

- CDE—California Department of Education
- CENIC—Consortium for Education Network Initiatives in California
- CPEC—California Postsecondary Education Commission
- CSU—California State University System
- CTAP—California Technology Assistance Program
- ECTL—Educational Council for Technology in Learning

EXECUTIVE SUMMARY OF THE STATE

California's education institutions continue to benefit from legislation and planning efforts going back several years. At the state level, the California Department of Education (CDE) is administering its School-Based Education Technology Grant program, which was funded through Senate Bill 1510 (1992), and more than $19 million in grants awarded through the Technology Literacy Challenge Fund. Public high schools in the state are occupied with implementing the governor's Digital High School Project. Within higher education, all eyes are focused on the California Virtual University project, an institution which will deliver its courses and degree programs entirely through distance education beginning in the fall 1998 semester.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Of all the states, California has demonstrated the most consistent dedication to assessing (and reassessing at regular intervals) its plans for educational technology. In 1989 and 1990, when other states' educational technology initiatives focused primarily on higher education, California had plans underway for K-12 schools' use of information resources. In 1990, the Advisory Committee on Information Technology (ACIT) was established by the state Superintendent of Schools with the charge of developing a strategic plan to define the best approach to building a statewide electronic highway that would extend to all schools, school districts, and county offices of education in the state. The ACIT released its Strategic Plan for Information Technology in September of 1991, which described the vision, mission, and recommendations of the group. To follow up on ACIT's recommendations, the Department of Education formed a Technical Planning Committee which included representatives from local school districts, county offices of education, and institutions of higher education. The Technical Planning Committee recommended that California design its networking standards and protocols so that its education networks would be compatible with the Internet.

While this network activity was taking place, California also concentrated on creating a master plan for educational technology in the schools. Assembly Bill 1470 of 1989 formed the California Planning Commission for Educational Technology. The Commission presented the *California Master Plan for Educational Technology* in 1992, which highlighted the need to coordinate educational technology among private and public providers and among the four segments of the state's public education: K-12 education, California Community Colleges, the

University of California, and the California State University. The Master Plan also recommended the establishment of the Golden State Education Network (GSEN) to create an integrated voice, video, and data link among existing networks. GSEN was established in 1992 by the passage of Senate Bill 1510 to deliver voice, video, and data to all learning locations in California, including public schools, college and university campuses, homes, libraries, museums, and community agencies. SB 1510 also established the Education Council for Technology in Learning (ECTL), which is charged with allocating educational technology funds and implementing the *California Master Plan for Educational Technology* as well as collaborating with the Industry Council for Technology in Learning.

In 1994, the California Department of Education released the K-12 Network Technology Planning Guide (updated in 1995), which outlined the technical specifications recommended for the school infrastructure, implementation issues which must be addressed in order for the network to be successful, and the priority which must be given to each of the network's elements.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Education Council for Technology in Learning (ECTL)***

The Education Council for Technology in Learning was created as a result of Senate Bill 1510, the Morgan-Farr-Quackenbush Educational Technology Act of 1992. ECTL has been responsible for the use and integration of educational technology in the public elementary, secondary, and postsecondary schools. The Council will be replaced in September 1998 by a Technology Advisory Committee appointed by the State Board.

- ***Industry Council for Technology in Learning (ICTL)***

The Industry Council for Technology in Learning (ICTL) is a non-profit council established as a result of Senate Bill 1510. The mission of the ICTL is to promote the infusion of effective technology into California schools and libraries resulting in improved learning for all Californians. The ICTL works closely with the Education Council for Technology in Learning.

- ***California Postsecondary Education Commission (CPEC)***

The California Postsecondary Education Commission is a citizen board established in 1974 by the state legislature and governor to provide independent, non-partisan policy analysis and recommendations about the state's postsecondary education system and to coordinate the efforts of the state's colleges and universities. Over the past several years, the commission has increasingly focused on higher education technology.

■ ***California Virtual University (CVU)***

California Virtual University is a nonprofit consortium of the state's public and independent institutions of higher education. Plans for CVU were drafted during the spring and summer of 1997 by a Design Team composed of more than 20 higher education participants. In November 1997, the governor and the chief executives of the University of California, the California State University, the California Community Colleges, Stanford University, the University of Southern California, and the Association of Independent California Colleges and Universities reviewed and approved the Design Team's plan.

■ ***California State University System (CSU)***

The California State University (CSU) system includes 22 campuses. Three key commissions provide executive leadership and oversight in dealing with technology and its impact throughout the CSU system. The Commission on Learning Resources and Instructional Technology (CLRIT) was formed in 1991 to focus on the academic uses of information technology to improve the quality of learning and teaching. The Commission on Telecommunications Infrastructure (CTI) oversees the development of technology prerequisites to support intra-campus infrastructure, inter-campus networks, and academic and administrative applications. Finally, the Commission on Institutional Management and Information Technology (CIMIT) serves as an administrative analog to the CLRIT, with an emphasis on increasing levels of institutional productivity and accountability.

The activities of the three commissions at CSU are formed by a variety of committees and task forces. The Technology Steering Committee (TSC) coordinates and integrates the work of the three commissions. The TSC consists of the six presidents who represent each of the system's member universities and serve as the chairs and vice-chairs of the three commissions; the Executive Vice Chancellor, the senior vice chancellor for academic affairs; the senior vice chancellor for business and finance; and the assistant vice chancellor for information resources and technology, who acts as the chair. The TSC makes recommendations to the Chancellor through the Executive Council. The Academic Information Resources Council (AIRC) coordinates the strategic development and equitable distribution of, and the appropriate access to, information resources and technology across the campuses of the CSU system.

Another important technology effort underway at the California State University system is the California Education Technology Initiative (CETI), a five year-old public-private partnership comprised of more than 100 representatives from CSU, GTE, Fujitsu, Hughes Communications, and Microsoft. The partnership provides a range of technology goods and services to CSU.

■ ***California Community College (CCC) System***

The technology efforts between and among California's 106 community colleges are coordinated by the Chancellor's Office.

■ ***Consortium for Education Network Initiatives in California (CENIC)***

CENIC is a higher education partnership involving the University of California, the California State University system, Stanford University, the University of Southern California (including the Information Sciences Institute), and the California Institute of Technology. CENIC has focused its initial efforts on developing the California Research and Education Network-2, which will build a unified statewide network linking the state's higher education institutions.

■ ***California Technology Assistance Program (CTAP)***

The California Technology Assistance Program (CTAP) is a state and county cooperative venture providing technical assistance and resources to California schools. CTAP focuses on staff development for teachers.

THE DRIVING FORCE

California's high-tech industrial base and its years of legislative activity underlie much of the state's educational telecommunications and technology initiatives. California has abundant information resources which impact students at every level of education. The need to continue supplying the high-tech companies based in the state with skilled employees has encouraged partnerships between business and public education. Legislation over the past decade supporting educational technology initiatives also reflects the high priority California places on developing the human resources necessary for its technology-related industrial base.

THE PLANS

■ ***K-12***

The California Department of Education (CDE) oversees the Digital High School program, an initiative stemming from Governor Pete Wilson's office and signed into law as Assembly Bill 64 (1997). The Digital High School program calls for a significant investment in computers, Internet access, and software for every one of California's 1.6 million high school students. AB 64 provides a one-time grant of $300 per student, matched by local school districts, to install a comprehensive computer network in each of California's 840 public high schools; in addition, permanent, annual funding of $45 per student, matched by local school districts, will be provided for maintenance and upgrade of these networks.

The CDE and the California Technology Assistance Project (CTAP) have cooperated in overseeing the School-Based Education Technology Grant Program, funded through Senate Bill 1510 (1992). CTAP conducted orientation seminars for Local Education Agency representatives in the closing months of 1997, and announced the slate of regional finalists in January 1998. CTAP also conducted school technology planning seminars for the finalists and provided technical assistance to schools throughout the early months of 1998. The ECTL reviewed final applications in March 1998, and in May the CDE approved the grant awards.

The CDE received a total of $20.6 million in first year Technology Literacy Challenge Funds, and awarded $19.6 million to school districts in a competitive grant program. In making award decisions, the CDE took into consideration whether a project contributed to the advancement of state or local systemic educational reform. Also taken into consideration was the fit between the proposed project and the recommendations identified in the CDE's past planning activities described in the documents: *Connect, Compute, and Compete*; *Building the Future: K-12 Network Technology Planning Guide*; *Getting America's Students Ready for the 21st Century*; *Getting Results, A Report by the Governor's Council on Information Technology*; the State's mathematics and reading initiatives; *California's Consolidated State Plan for Improving America's Schools Act*; and *Local Improvement Plans.*

Headquartered in the Los Angeles County Office of Education, TEAMS (Telecommunications for Educational Advancement in Math and Science) Distance Learning provides satellite-delivered instruction to 20 states, the District of Columbia, and the US Virgin Islands. The programs are produced and transmitted by the Educational Telecommunications Network (ETN) to elementary-level students, teachers, and parents in support of the national mathematics and science reform goals. TEAMS, a four-time recipient of Star Schools grants, offers mathematics and science instruction to students in grades 4 through 7, and social science and language arts courses to students in grades 4 through 6.

■ ***E-rate***

K-12 schools and school districts in California are responsible for their own E-rate applications. The California Department of Education (CDE) has worked with the Association of California School Administrators (ACSA) and the California County Superintendents Education Services Association (CCSESA) to develop an approval and application process. In addition, CDE has provided guidance concerning the application process, disseminated sample technology plans, and sponsored half-day workshops at four locations throughout the state.

■ ***California Postsecondary Education Commission (CPEC)***

Over the past few years, the commission has conducted a number of technology-related activities. In 1995, the commission produced two long-range planning reports, *The Challenge of the Century*, and *A Capacity for Growth*. These reports detailed major increases in enrollments within the state's institutions of higher education and pointed to technology as one means of accommodating the demand for postsecondary education. In 1996, the commission published *Moving Forward*, which specifically focused on higher education technology. The commission also conducted a survey of national and state higher education technology initiatives and reviewed pertinent state legislation regarding technology innovation. Most recently, the commission published *Coming of [Information] Age in California Higher Education* in February 1997. This latest report summarized the technology initiatives at the state's three public systems of higher education, discussed technology and pedagogy, and listed the challenges confronting the commission as it faces technology-related issues.

■ ***California Virtual University (CVU)***

The California Virtual University is the by-product of discussions going back to 1996 that involved the California Postseconday Education Commission (CPEC) and the Western Governors Association (WGA). Rather than accept WGU's invitation to join the Western Governors University, CPEC decided to consider planning a virtual university based on the more than 300 accredited institutions of higher education in California. In November 1997, Governor Pete Wilson reviewed and approved a plan for a California Virtual University submitted by a broad-based design team. Assembly Bill 2431 (1998) established the California Virtual University and required that CPEC utilize distance education through the virtual university to achieve the state's educational goals of access, quality, choice, efficiency, and accountability. CVU's goal of better meeting the educational needs of the citizens of California by providing quality, effective, appropriate education at a distance has three subcomponents. First, CVU will seek to expand access within California to postsecondary education and assist the state in meeting the needs of the nearly 500,000 students projected to enter California's higher education institutions over the next decade. Second, CVU will strive to enhance California's economic competitiveness by providing additional educational opportunities to adults over their lifetimes and new partnerships for delivering education to businesses and industries. Finally, CVU will try to establish California as a global leader in the design and delivery of new forms of distance education, in research and discovery of new modes of instruction, and in the distribution of educational content and services to the global market.

A key component of CVU's design is the quality and adequacy of support services provided to students, which traditionally have been the root of many distance education students' dissatisfaction. CVU has developed plans for three types of services to assist students. First, CVU will offer each degree-seeking student a "home campus," a campus from which they will receive advising, counseling, health care, career advice, and other student services. CVU will also host an online student center, and provide students with information, online tours, answers to frequently asked questions, and career information. To ensure that the needs of CVU students are met, CVU will work with institutions to develop new training techniques for educational counselors at the highs school level and above.

■ ***California State University (CSU)***

Since 1996, CSU has been developing its Technology Infrastructure Initiative (TII), a multi-phase project to address the requirements, design, build-out, ongoing upgrade, and financing of CSU's internal technology information infrastructure. The work of the TII aligns with CSU's overall Integrated Technology Strategy (ITS), a plan to develop technology solutions for anticipated high enrollments and budgetary constraints and meet basic information competency levels across CSU's campuses. As part of the TII, a Systemwide Internal Partnership (SIP) Committee was initially formed to define a minimum technology baseline for each campus. The SIP team is in the process of solidifying its relationships with the TII partner organizations, which were selected in September 1997. A plan entitled, "Partnership Plan: Framework and Status Report," outlines the scope of ITS-TII partnership, financial plans, and preparations for implementation. As the TII enters the implementation phase, however, a new organization will assume the SIP committee's responsibilities. CSU will create a Commission on Technology Infrastructure and Partnerships (CTIP) to replace both the SIP committee and the existing Commission on Telecommunications Infrastructure (CTI). CTIP will focus on further developing CSU's Integrated Technology Strategy and will recommend and advise technology strategies and policies for relationships between and among all 22 CSU campuses.

CSU received state funding during the 1996-97 fiscal year to make available its system-wide network (CSUnet) to the California Community Colleges. The new network, 4CNet, will serve the institutions' academic and administrative missions, goals, and objectives. Through the network, all community colleges now have access to data, video, and voice communications. The document, *A Collaboration Venture and Service of the California State University and the California Community Colleges*, outlines the agreement.

■ ***California Community Colleges (CCC)***

Since 1994, CCC has been focusing on its Telecommunications and Technology Infrastructure Program (TTIP), which established standards and guidelines for the development and implementation of a comprehensive telecommunications infrastructure, including 4Cnet. TTIP's first two years consisted of a strategic planning process. The result of the process was a 1996 recommendation for a two-phase strategy of inter- and intra-college development. During the 1996-97 school year, CCC put into place the organizational and technical foundations for a statewide backbone to connect all sites. Activities during the following year centered on faculty and staff development and implementation. The 1998-99 academic year will include further interconnectivity, completion of a library automation process, and expansion of the backbone to accommodate video on 4CNet. Between four and six community colleges will participate in the Community College Video Pilot Project using 4CNet.

THE FUNDING SOURCES

Although California has been a long-time leader in legislative and planning initiatives to expand technology on a statewide level, since 1987 the state has lagged behind in securing long-term systemic funding in support of telecommunications infrastructure.

■ ***K-12***

California received a total of $19.5 million in Round 1 Technology Literacy Challenge grants. In February of 1998, the state Board of Education approved 25 grants ranging from $87,000 (Pierce Joint Unified schools) to $4.08 million (Los Angeles Unified schools), to schools in all 11 regions of the state.

AB 64, which created the Digital High School program, provided $100 million in funding for the first year of the program (1997-98), enough for 216 high schools to receive installation grants. The Governor's proposed budget for the coming year calls for $136 million in funding;

additional funding will be provided in the following two years. Every California public high school is slated to receive a grant within four years.

K-12 schools in the state have benefited from the Pacific Bell Foundation (formerly the Telesis Foundation). Pacific Bell has been working since 1994 to provide technical resources to public schools and libraries in California in its Education First project. The goal of Education First is to help schools establish the telecommunications infrastructure schools need to access the Internet and/or participate in videoconferencing with other sites, and to help develop the skills to effectively exploit the value of interactive data and video applications. As part of the Education First initiative, Pacific Bell has offered free installation of up to four Integrated Services Digital Network (ISDN) lines at each school or library site, plus one year of free service. At the year's conclusion, Pacific Bell offers a special ISDN flat discount rate of $40 per month of unlimited usage. As of January 1998, 7,165 Education First ISDN lines had been installed.

The Pacific Bell Foundation has awarded technology grants to a number of California schools. The foundation provided $435,000 to support Education for the Future, an initiative that evaluated the effectiveness of the Internet, videoconferencing, and e-mail. The foundation also awarded a grant of $10,000 to the Hispanic Education and Media Group to support a national curriculum that focused on reducing dropouts among Hispanic youth. The foundation's award purchased three Internet-ready laptop computers.

- ***California State University System (CSU)***

As part of its Information Technology Strategy, CSU has funded projects that promote the development and support of campus and multi-campus information competence. In 1996, CSU, through the Commission on Learning Resources and Instructional Technology's (CLRIT) Academic Opportunity Fund, funded six, information competence-related proposals ranging from $7,000 to $64,000. During the 1997-98 fiscal year, CSU supported six additional information competence projects with awards ranging from $25,000 to $50,000. For the 1998-99 fiscal year, CLRIT will release a total of $236,000.

- ***California Community Colleges (CCC)***

The CCC Telecommunications and Technology Infrastructure Program (TTIP) received $9.3 million in the 1996-97 Budget Act as part of the base budget of the California Community Colleges. TTIP was awarded an additional $18 million in the 1997-98 Budget Act. Of this amount, $4 million created a faculty and staff development fund and $2.5 million supported statewide computer upgrades.

- ***Consortium for Education Network Initiatives in California (CENIC)***

As part of its first project, to build the California Research and Education Network-2 (CalREN-2), CENIC submitted a proposal of $3.85 million to the National Science Foundation (NSF). The NSF funds would provide partial support for Phase I of CalREN-2.

■ ***Public Utilities Commission (PUC)***

Assembly Bill 1302 (1995) and Assembly Bill 1519 (1996) established the PUC's Education Technology Trust Fund with an allocation of one-time funding totaling $35 million. On April 10, 1997, $29 million of these funds were allocated by the State Allocation Board and the Office of Public School Construction (OPSC) to 866 districts which submitted applications. Each participating Local Education Agency (LEA) received a grant for a specified school of $21,500 and an additional amount of funding based on district pupil enrollment. The Education Technology Office has recently distributed $4.05 million to LEAs in conjunction with the Education Technology Grant Program of 1996. Each agency that participated in the OPSC program was awarded $1,000 to provide for staff development at the school site, as well as additional funds, based on district-wide enrollment, to be spent on LEA staff development.

TECHNOLOGY

■ ***CalREN-2***

Plans for CalREN-2 consist of two high speed clusters (one in the north, the other in the south) forming distributed gigapops using Internet 2 architecture. The core of the network is IP Packet-over-SONET OC-12c. A second OC-12c path around the metro SONET rings will be used for ATM-based services. Connections from each SONET ring to other CalREN-2 nodes are at University of Southern California (in the south) and University of California at Berkeley (in the north). Gateways for connecting to external service providers or other research networks exist at Stanford University, the University of California at Berkeley, the Information Sciences Institute, and the California Institute of Technology.

■ ***4CNet (CSUnet)***

4CNet is a high speed data, voice, and video network connecting all 22 California State University campuses and the California Community Colleges. Over the next two years, 4CNet will upgrade its infrastructure to ATM. By the spring of 1999, 4CNet's backbone will be upgraded to OC-3, and all CSU campuses will have OC-3 connections by the winter of the year 2000.

■ ***Educational Telecommunications Network (ETN)***

The Los Angeles County Office of Education owns and operates ETN, a satellite broadcasting system. ETN telecasts live, interactive staff development and parent programs to school districts across the state as well as throughout the US.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

California's many institutions of higher education, its rich technology industry, and its proactive legislature have strongly influenced telecommunications planning and implementation. The amounts of funding directed by the state legislature and private industry at technology initiatives for every level of education, and the activities themselves, are numerous. From K-12 projects to the California Virtual University, the state has been on the leading edge in creating technology initiatives that other states have quickly adapted. Although over the past ten years there have been a number of attempts to centralize technology and telecommunications planning, the sheer number of projects taking place in the state make it doubtful that coordination will ever occur. When it comes to collaborating, California's educational institutions continue to favor pursuing projects within their own particular sectors—higher education working with higher education, K-12 working with K-12, both of the sectors working with private industry.

COLORADO

ACRONYMS AND NETWORKS

- CATI—Colorado Advanced Technology Institute
- CCCOES—Colorado Community College and Occupational Educational System
- CECC—Colorado Electronic Community College
- CIVICS—Cooperative Interactive Video in Colorado State Government
- CRTP—Colorado Rural Technology Project
- HETA—Higher Education Telecommunications Alliance
- IMC—Information Management Council
- TLC—Technology Learning Committee

EXECUTIVE SUMMARY OF THE STATE

Through the interagency Connect Colorado initiative, Colorado has begun to coordinate its plans for a statewide telecommunications network. The $20 million project will link the county seats through a variety of technologies, and will provide voice, video, and data services to every school, hospital, and state and county office building, Connect Colorado represents the state's latest attempt to connect the many networks independently operating throughout the state. The state plan results from the efforts of the Multi-use Network Task Force (MNT), a state appointed committee that is responsible for examining the role of telecommunications in the state. The task force presented its recommendations to the legislature in February 1998. Higher education institutions in the state have contributed to the statewide planning project, even as they further develop their own online course offerings. The Colorado Department of Education also participated in the Connect Colorado project, and is involved in further developing schools' technology plans in accordance with the vision outlined in the *Technology in Colorado Education Strategic Plan 1994-2004.*

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Earlier in the decade, individual institutions in Colorado assumed the burden for independently planning and supporting educational technology projects. The outcome of these separate endeavors was a series of networks connecting various regional consortia and campuses, notably those of the University of Colorado System and the community colleges. Results within K-12 education were strikingly similar—since there were no criteria concerning the appropriateness of the technology or application established prior to awarding the funds, there was no continuity among the projects and networks. One exception to these disparate efforts was the CIVICS intrastate network, the Cooperative Interactive Video in Colorado State Government. The CIVICS compressed video network involves the joint participation of higher education institutions and state government, and is used primarily for delivering higher education courses between campuses and remote arraignments between county court houses and state prisons.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Colorado Commission on Information Management (IMC)***

The Colorado Commission on Information Management (IMC) was created during the 1987 legislative session. IMC is charged with overseeing strategic planning and setting policy for the state's information systems; and assuring continuity in planning and controlling the state's investment in information systems. The 15-member commission includes eight governor appointed members from the private sector, seven members from state government, one from the State Senate, one from the House of Representatives, the Executive Director of the Department of Personnel/GSS, the executive directors of three principal departments, and the State Court Administrator.

■ ***Multi-use Network Task Force (MNT)***

The Multi-use Network Task Force was established in October 1997 to outline a statewide plan for a leased telecommunications network. The MNT consists of representatives from state agencies including the Department of Education, State Libraries, Commission on Higher Education, General Support Services' Telecommunications Division, and the Commission on Information Management. In February 1998, the MNT completed and released its Strategic Plan for a Statewide Telecommunications Infrastructure.

■ ***Colorado Advanced Technology Institute (CATI)***

The state legislature created the Colorado Advanced Technology Institute in 1983 to serve as the state's science and technology development agency. The Institute supports Colorado research universities and non-profit organizations engaged in technology transfer, high tech business incubation, and rural development through telecommunications technology. CATI houses the Colorado Rural Technology Project (CRTP), which funds advanced technology projects in areas facing a decline in agriculture and natural resources industries.

■ ***Colorado Commission of Higher Education (CCHE)***

The nine member CCHE promotes and preserves quality, access, and efficiency within Colorado public higher education. CCHE serves as the legislative liaison for the six higher education systems in the state.

■ ***K-12***

Within the Colorado Department of Education (CDE), the Education Telecommunications Unit assumes responsibility for helping school district and department staff provide students, teachers, administrators, and community members of all ages with equal educational opportunities, regardless of where they live. To accomplish this, the unit provides technical assistance to local school districts, BOCES, institutions of higher education, and libraries for the planning and development of regional and statewide telecommunications (voice, video, and data) networks to meet local needs. The Education Telecommunications Unit supports the efforts of the Colorado Telecommunications Advisory Commission, the Colorado Learning Network, and other regional and statewide cooperative efforts. The unit also facilitates and coordinates the use of distance learning and other technologies by department staff to deliver training, conduct statewide and regional meetings, disseminate information, and provide technical assistance.

- ***Technology Learning Committee (TLC)***

The TLC is the oversight group responsible for the administration of the Technology Learning Grant and Revolving Loan Program. Established by Senate Bill 96-197, the TLC includes members representing the Department of Higher Education, the Department of Education, and the Information Management Commission. SB 96-197 oriented the program toward the purchase of educational computer system equipment through the disbursement of grants and loans.

THE DRIVING FORCE

Although different agencies, councils, and committees have tried to develop effective networking solutions and plans, the policies that have been recommended have been too limited in scope, and consequently met with impasses in the state legislature. The lack of a champion in Colorado for a statewide, high speed telecommunications network has encouraged inefficiencies in services among state agencies. Trimming the redundancies, promoting information and technology sharing, and developing and implementing technology standards are all at the heart of the state's current planning activities.

THE PLANS

- ***Connect Colorado***

"Connect Colorado" is an umbrella term for the state's comprehensive initiative to improve citizen satisfaction with government services, enhance government efficiency, and link our schools through the use of technology. In 1996, the General Assembly passed, and the governor signed into law, SB 96-102, which charged the Information Management Commission (IMC) with developing, implementing requirements for, and maintaining a statewide communications network. The governor followed up this action by issuing an executive order in 1997, instructing the Executive Director of the Department of General Support Services to coordinate a statewide approach to information technology, encompassing strategic planning, technical reviews by state agencies, and enhanced delivery of technical services.

To this end, in April 1997, the IMC released the Colorado Strategic Technology Direction and Initiatives, a document that describes a vision for the management of information technology in Colorado; it is modeled after *North Carolina's Information Resource Management Commission's 1995 Statewide Technology Strategy and Initiatives* document. The IMC document was meant to provide the foundation upon which more detailed and specific standards and plans could be developed to implement technological approaches for improving the quality and efficiency of government services. According to the document, state government can use information technology resources to respond to two powerful demands: a demand for new, more responsive, and expanding services, and a need to reduce the cost of operations.

The long-term vision for information technology in Colorado is based on the need to develop an information management infrastructure that provides complete, accurate, and up-to-date information, which is delivered in a useful manner and at reasonable cost. This infrastructure would consist of an integrated statewide communications network, with uniform technical features and characteristics that assure all organizations will be able to share information and integrate services within an environment that satisfies the appropriate level of security.

As envisioned by the IMC, the proposed Colorado Statewide Telecommunications Infrastructure would use advanced switched and optical telecommunications technology, and would provide the capability to transmit large quantities of video, voice, and data signals at high-speeds linking all agencies, citizens, and business partners of the state.

To make more concrete plans about the statewide infrastructure, in October 1997 the Multi-use Network Task Force (MNT) was assembled to evaluate the state's current and future use of telecommunications and to make strategic recommendations based upon its findings. The task force included representatives from the Departments of Higher Education, Education (K-12), Personnel/GSS, the Commission on Information Management (IMC), and State Libraries. The MNT's February 1998 report, *Strategic Plan for a Statewide Telecommunications Infrastructure* outlined a series of recommendations to the state legislature that would enable the infrastructure's creation. Among its proposals, the MNT recommended legislation be enacted that would mandate the participation of all state agencies, including higher education, in the aggregation of telecommunication circuits to optimize the economies of scale. The MNT also recommended that the legislature allocate one-time capital funding of $13.5 million to acquire Customer Premise Equipment to aggregate State circuits over a telecommunications infrastructure. The MNT also proposed that a central authority be established to provide control and oversight of the state network infrastructure. Although the IMC now has the responsibility of implementing the network, the MNT suggested that the authority should rest with the Colorado Information Technology Services (CITS) Division of the Department of General Support Services.

■ *K-12*

The Colorado Department of Education's (CDE) vision for technology is to take a leadership role in creating an environment where students, educators, and Colorado residents have access to and use technology for student achievement, communication, and information needs. CDE focuses its efforts in four areas. First, in an initiative stemming back to 1994, the CDE began a project at the request of the legislature and school districts to make recommendations for potential improvements to the methodology and automation of data collection at CDE. In order to comply with legislative, other state, and federal data collection mandates, and to provide more efficient use of resources throughout Colorado's educational system, a new statewide data exchange has been envisioned as an automation and update of the current data collection system. Data automation will also provide all parties interested in education with access to accurate and reliable information. The CDE plans to implement the automated data exchange system during 1998.

Second, the CDE has collaborated with the Connect Colorado working group to plan a shared telecommunications infrastructure for school districts and libraries, institutions of higher education, and state government. The goal of the statewide telecommunications infrastructure is to provide a community network hub in every Colorado community to interconnect every school district, public library, college, university, and government office.

Third, the CDE works with the Colorado State Library, which administers the statewide Access Colorado Library and Information Network (ACLIN). This network provides no-cost access for every resident of the state to online library information resources of state government and non-profit, public service organizations. ACLIN continues to grow and develop in terms of usage, content, and services. Ultimately, ACLIN will be folded into the state's public network.

Finally, during 1998 and 1999 the CDE will develop the Colorado School for the Deaf and Blind Network (CSDB). This project will provide CSDB students with access to computers, software, and appropriate adaptive equipment, in preparation for participation in higher education and job competition.

The Colorado Department of Education's goals for technology stem from its *Technology in Colorado Education Strategic Plan 1994-2004*, which was written in 1994 by the CDE's Technology Priority Team. The plan identifies eight goals for statewide K-12 technology that relate to access, infrastructure, and the integration of technology into educational standards.

■ ***E-rate***

In Colorado, the Library, Education, and Health Telecommunications Coalition (LEHTC) has assumed leadership in working on behalf of the state's public institutions. LEHTC, along with the Colorado Department of Education, has disseminated information to schools throughout the state and has submitted its input to the FCC. Schools in Colorado must complete their own applications for E-rate discounts.

THE FUNDING SOURCES

■ ***Colorado Advanced Technology Institute (CATI)***

CATI sponsors the Colorado Rural Technology Program, which annually provides seed grant funding to increase economic activity in rural Colorado through the application and diffusion of information technology. Organizations proposing community-based technology projects for rural service areas in Colorado are eligible to apply. In fiscal year 1998, the program awarded 8 grants ranging from $10,000 to $33,000. Fiscal year program funding is contingent upon allocations from the Colorado legislature and the CATI Commission.

■ *Technology Learning Committee*

Senate Bill 96-197 authorized the Technology Learning Grant and Revolving Loan Program with the goal of enabling institutions of higher education, schools, and public libraries to receive funding for the development of distance education or other technologically assisted learning programs. The general purpose of the law was to create extraordinary learning opportunities for students and citizens throughout the state. Five goals related to technology guide the committee's grant making activities: access, equity, connections, content, and training. The TLC began meeting during 1996 and developed a request for proposals (RFP), which was issued on November 1, 1996. In the RFP, the TLC encouraged applicants to submit grant proposals, loan proposals, or combined grant and loan proposals. The TLC particularly encouraged proposals from partnerships between and among eligible K-12 schools, libraries, and higher education institutions. The TLC received a total of 178 proposals on the January 6, 1997, submission deadline. Applicants requested approximately $100 million in grants and $4 million in loans. The largest proposal submitted sought approximately $8 million and the smallest proposal was for approximately $6,600. The Capital Development Committee (CDC) approved the final list of projects in March 1997 and the Department of Higher Education began disbursing funds to grant/loan recipients the following month. The TLC awarded $20 million in grants and loans to 43 educational and community-based partnerships throughout Colorado. Approximately $250,000 of the total funds awarded were in the form of interest-free loans. By virtue of the RFP, all of the proposals that received funding included some component of matching funds, which were either cash or in-kind contributions. Most projects will extend until June 1999.

■ *K-12*

Technology Literacy Challenge Funds in 1997 provided support for 18 technology initiatives in the state. Schools, school districts, and consortia received awards ranging from $28,000 to $200,000.

TECHNOLOGY

■ *Connect Colorado*

The MNT's *1998 Strategic Plan for a Statewide Telecommunications Infrastructure* described an infrastructure built on demand aggregation, private/public partnerships, participation and cooperation, a central coordination authority, and community incentive funding. The MNT emphasized that participation on the statewide network by state-funded users must be required. That is, the loss of an aggregated demand would weaken attempts to provide access to advanced services across the state.

Under the MNT's plan, the statewide network would be based on state-funded circuits to the 63 county seats and 12 other sites, a series of Aggregated Network Access Points (ANAPs) with geographic coverage have been identified. ANAPs would define state network service demand for current service levels, anticipated growth, and desired service capabilities. This initial group of 75 ANAP sites may change as significant demand for additional service is identified in other communities. These would include communities with Department of Corrections' sites, and other public or non-profit users that in combination with state technology sites will benefit from a local ANAP designation. The proposed technology for the statewide network will use Asynchronous Transfer Mode (ATM) over high speed fiber facilities in well-established infrastructure areas of the state, and over multiple T-1 services at sites that currently have lesser developed infrastructure. The ANAP locations will ideally be interconnected by Asynchronous Transfer Mode services, and SONET or DS-3 technology will be used to deliver the services. The network switches proposed for this project would be capable of accommodating either technology for backbone services.

The MNT estimates that supporting the network would involve a one-time capital outlay of $13.5 million, with $13 million in annual operating costs and $161,000 per year for additional costs.

■ ***Cooperative Interactive Video in Colorado State Government (CIVICS)***

CIVICS is a compressed video system that is distributed over a statewide digital microwave network and LEC private lines, CIVICS includes four sites that use Picture Tel equipment, and delivers higher education courses among campuses throughout the state. The network is also used for remote arraignments between county courthouses and state prisons, and for telemedicine. State agencies also use CIVICS to conduct meetings as a cost reduction mechanism.

■ ***Higher Education***

Colorado University has been offering asynchronous learning courses since 1996. Over 60 Internet courses are in development by CU faculty, and more than 800 students have enrolled in CU Online courses over the past two years. Although there are no complete degree programs available through CU Online, students can receive an MBA degree from the University of Colorado at Colorado Springs. UC Boulder intends to offer an online master's degree in public administration beginning in the fall of 1998.

The University of Colorado's Intranet links its four campuses in Boulder, Denver, Colorado Springs, and the Health Sciences Center in Denver. The network will be upgraded from DS-3 to OC-3 with M-PEG 2 capabilities. Although the Intranet is used primarily for administrative and business purposes, the bandwidth upgrade will permit the delivery of broadcast quality video.

■ ***Colorado Electronic Community College (CECC)***

Colorado Community College & Occupational Education System (CCCOES), established in 1986, is the largest system of higher education in the state. CCCOES now offers the Colorado Electronic Community College (CECC), which allows students to receive an Associate of Applied Science in Business degree entirely through the Internet. A student can register at any of the 13 campuses and complete the course anytime, anywhere through Online. CECC currently offers 21 courses per semester. A second version of CECC Online is available through Jones Intercable's Mind Extension University. Faculty and staff throughout the state develop courses which are broadcast across the country on cable networks. During the programs, faculty are available for voice or Internet interaction with students. Although a number of telecourses have been developed, an associate in arts degree is the only complete degree program available through CECC.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

For any state, the absence of a strong leader or lead agency to advocate for an advanced telecommunications infrastructure causes problems. When attempts to fashion statewide policies repeatedly encounter defeat— the situation in Colorado over the past several years—it is easy for different groups of stakeholders to prefer to direct their energies at independent planning. Despite the flurry of coordinated statewide planning that has taken place in Colorado since 1996, there is still some doubt whether the state's vision for an infrastructure will be realized. Although the governor has voiced his support for Connect Colorado, telecommunications has not been a prime concern to him until recently and he is concluding his final term in office. If enabling legislation does not pass this year, then it will take some time before the state is able to make another consolidated effort.

CONNECTICUT

ACRONYMS AND NETWORKS

- CCTC—Connecticut Community-Technical Colleges
- CSU—Connecticut State University
- DHE—Department of Higher Education
- DoIT—Department of Information Technology
- JCET—Joint Committee on Educational Technology
- RESC—Regional Education Service Center
- SDE—State Department of Education
- UCONN—University of Connecticut

EXECUTIVE SUMMARY OF THE STATE

Connecticut has made slight but apparent progress towards more coordinated planning and implementation of educational telecommunications and technologies, especially within K-12 education. Planning and policy efforts in the state have been widespread. During the 1997 legislative session, the General Assembly acted on Governor Rowland's request to outsource the management of the state's information technology. These legislative actions also created the Department of Information Technology (DoIT) in July 1997, which merged into a separate department the planning and project management functions of the Office of Policy and Management, and the agency support operations of the Department of Administrative Services. A recent effort by the legislatively created Task Force on Educational Telecommunications resulted in a number of recommendations that have not been met with sufficient funding.

The lack of a statewide, state-supported infrastructure has hindered the development and use of educational technology, but this situation may soon change. In February 1997, the Department of Information Technology issued an RFP for statewide telecommunications services and management. This outsourcing is likely to enhance the backbone for infrastructure, thus promoting technology efforts.

Higher education efforts in distance learning and the use of technology have been disjointed among the several institutions and systems. The Department of Higher Education is actively seeking ways to coordinate both infrastructure and programmatic development among the institutions, and is awaiting the results of the RFP before proceeding with efforts toward establishing a common network infrastructure for the public institutions of higher education.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

In the past, Connecticut state agencies handled their own telecommunications. Planning and coordination took place from the bottom up, based on immediate agency objectives. Yet Connecticut has long recognized the need for planning and coordination through the state's Joint Committee on Educational Technology, which legislative statute established in 1991. The legislature, in theory, has often agreed with the need for action on recommendations.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Joint Committee on Educational Technology (JCET)***

The more than 40 members of the Joint Committee on Educational Technology represent higher education, K-12, labor unions, schools' media resource people, Regional Education Service Centers, as well as appointments from the governor, and the majority and minority houses from the legislature. The committee serves an advisory role to the State Board of Education and higher education to coordinate more effectively and efficiently the use of educational technology. The Joint Committee issues to the legislature an annual report on the status of educational technology along with funding recommendations.

■ ***Task Force on Educational Telecommunications***

A legislative act created the Task Force on Educational Telecommunications in 1996 to examine ways in which the state can develop and support educational technology in primary and secondary schools in the state, and specifically to identify funding resources for the infrastructure necessary in the coming decade in the state's schools, libraries, and institutions of higher education. The Task Force issued its final report in January 1997. This put forth many of the funding recommendations made earlier by the Joint Committee on Educational Technology. Its chief recommendation was that the state needed to provide leadership and coordination to establish an infrastructure that will accomplish equity, interconnectivity, efficiency, economic development, and diversity goals for the state.

■ ***Department of Information Technology (DoIT)***

The Department of Information Technology, having only recently gained independent agency status, aims to establish a new statewide capability at a much higher functional level than what is currently achieved in most agencies. A strategic plan was to be disseminated in March 1998, which will be published officially for the fiscal 1999-2001 biennium. DoIT is working with the State Department of Education, the State Library, and higher education institutions to try to reach consensus on most technology choices. The efforts will lead to a common contract for services, allowing interoperability and leveraging of collective buying power.

■ ***State Board of Education***

The State Board of Education and Joint Committee on Educational Technology developed the *Connecticut Statewide Educational Technology Plan* in 1995. Each of the school districts subsequently developed their own technology plans. The SDE coordinates activities at the state level, but leaves most of the decision making and implementation to the individual school districts. The six Regional Education Service Centers (RESCs) have been assuming an increasingly greater role as providers of professional development and technology training in the state.

■ ***Board of Governors for Higher Education/Department of Higher Education***

The Board of Governors for Higher Education serves as the statewide coordinating and planning authority for Connecticut's 26 public colleges and universities, which include the University of Connecticut, Connecticut State University System, Connecticut Community-Technical Colleges (CCTC), and Charter Oak State College. The Board's duties include establishing statewide policy and guidelines, developing a master plan for all of postsecondary education, approving mission statements, reviewing new academic programs, and accreditation. The Department of Higher Education (DHE) serves as the administrative arm to the Board of Governors. As such, the Department implements Board policies and recommendations and advises the Board on relevant issues.

The DHE surveyed each of the state institutions regarding their technological infrastructure and use in 1996, and discovered that each institution has been working independently on both infrastructure and programming. The DHE is encouraging more collaboration and cooperation among the institutions, but was not awarded funding for staff support in this area. The DHE has explored the feasibility of creating a Higher Education Network for Connecticut. These efforts, however, have been put on hold until the results of the RFP for statewide management of telecommunications are made known. There may be allotments for higher education in the RFP for that system. Resources and funding will be targeted for faculty and staff development in the use of technology. An advisory committee made recommendations to the Board of Governors in April 1998 for the public higher education system. Technology, as well as finance, mission differentiation, and collaboration, are some of the components of the recommendations.

The following are the recommendations: ❶ The State of Connecticut should establish a coordinated, cost-effective approach to distance learning that cuts across all institutions of higher education. ❷ The Board of Governors should convene a regional summit to discuss creating a multi-state virtual university, allowing students to have access at any time. ❸ The Board of Governors should explore creating a virtual library in Connecticut similar to those in Georgia and Florida. ❹ Charter Oak State College should be allowed to grant graduate level degrees and training certificates.

■ ***Connecticut Community-Technical College System (CCTC)***

The CCTC system oversees several planning efforts to promote the development and use of technology. The system established an Academic Information Technology Advisory Committee, which conducted a survey of faculty computer needs as its first project. Results revealed that a large number of faculties would like training in development of World Wide Web pages. The Council of Presidents established a Technology Committee to examine technology needs in the system. A technology infrastructure committee was also established. The Community-Technical College system collaborated with Charter Oak State College in a pilot distance learning project. Students can select courses available from a variety of public and private higher education institutions within Connecticut; administration is handled centrally so that the registration and enrollment process is seamless for students, even though they may be taking courses simultaneously from a community-technical college and a university.

THE DRIVING FORCE

Governor Rowland's initiative to make state telecommunications more cost efficient by outsourcing information technology services will significantly impact the future approach to and direction of information technology in the state across all sectors. The legislature appears to be committed to development of educational technology in theory, but remains tentative concerning the funding of initiatives.

THE PLANS

■ *Department of Information Technology*

The RFP for Information Technology Services, released in February 1997, calls for a primary contractor to manage the development of an information technology infrastructure in the state, including procurement, development, management and support of networks and other common services. Voice, WAN, LAN, and video services are part of the expected telecommunications services to be provided. The Department of Information Technology is statutorily responsible for managing the planning and delivery of the contract for outsourcing state telecommunications services. Responsibilities of DoIT, the contractor and partners, school districts, and higher education institutions will only be decided upon as the contract is finalized. The contract for services will commence by July 1998. Consolidation of voice, data, and video services will not be made until there is a demonstrated rationale.

■ *Task Force on Educational Telecommunications*

Few of the final recommendations made in January 1997 by the Task Force on Educational Telecommunications have been adopted. The Task Force recommended strong state leadership and investment in infrastructure, the establishment of a high-speed, statewide, multimodal network for education, increased staff at SDE and RESCs to assist in planning and implementation of technology, and model programs to address equity issues brought up in the 1996 Scheff v. O'Neill case, in which the plaintiff succeeded in its position that school districts are funded inequitably.

Funding recommendations of the Task Force for 1997-99 mirrored the platform adopted by the Joint Committee on Educational Technology, and included $50 million for the education technology infrastructure grants. A recommendation by the governor resulted in an award of $20 million to support this program. Some of the funding recommendations have been incorporated into HB 5294 to be decided upon by May 1998. These include funding of model programs to address the equity and educational quality issues, support for the Connecticut Library Network, a Department of Higher Education Information Technology network, and the continued funding of the Educational Technology Infrastructure grants under the State

Department of Education over the next five years. There are also proposals for SDE Teacher Training Programs to be coordinated by the RESCs.

■ ***Educational Technology Infrastructure Grant***

This grant program, established in 1995, assists local and regional school districts, regional educational service centers, and cooperative arrangements among one or more districts to upgrade or install wiring, cable, or other distribution systems. It also provides assistance with developing infrastructure improvements to support telecommunications and other information transmission equipment. The program is a step toward achieving a vision developed by the State Board of Education and the Joint Committee on Educational Technology that every school building have the capacity for interactive video, state and national network connectivity, and in-building capacity for students to interact daily with these technologies. All previous efforts to this end have been accomplished as individual initiatives. This fund does not cover the purchase of computers, software, or other end-user peripherals. Districts must have an approved technology plan in order to apply for funds. Since 1995 $20.4 million have been allotted to 138 projects that included 119 of the 166 public school districts.

■ ***E-rate***

According to most estimates, schools in Connecticut will receive E-Rate discounts at about 50 percent overall, with poorer districts receiving a full 90 percent. These will be combined with state funds, but no state application is being filed. The technology infrastructure grants program required schools to articulate technology plans, putting the schools in a good position to apply for the E-rate discounts. The SDE has been sponsoring workshops for the application process.

■ ***Higher Education***

The legislature mandated the adoption of baseline proficiency and competency requirements for teachers by July 1998. A committee is working with the schools of education at the various institutions to identify technology requirements for educators.

■ ***Southern New England Telephone/Americast***

SNET is the first telephone company in the country to establish a statewide cable franchise that will compete with private cable companies. To obtain the franchise, SNET, offered a single channel for educational programs beyond local access requirements. As the cable service is rolled out gradually in Connecticut towns, the Education Channel will be initiated. Hezel Associates has completed a needs assessment and business plan for the Education Channel.

<u>THE FUNDING SOURCES</u>

■ ***K-12***

The Educational Technology Infrastructure grant program is funded by the legislature through bond issues. For the 1997-1999 biennium, $20 million was made available; an increase of $10 million over the original amount set by the legislature. As of July 1998, $20.4 million had been distributed. Technology Literacy Challenge Funds (TLCF) were distributed in the amount of $1.5 million for the first year, and $3.8 million has been received for the second year, which will support professional development.

■ *Higher Education*

The Telecommunications Improvement Fund for public higher education institutions created a $15M bond fund in 1995. Ten million dollars of that have been distributed, and the remaining $5M will be disbursed in FY 98-99. The funds are being used for networking infrastructure development.

TECHNOLOGY

■ *K-12*

Since there is no statewide network, Internet connectivity is left to the individual districts to work out. Educational institutions will be able to use the statewide contract for educational telecommunications needs, as necessary, once it is established. The 1997 CABE (Connecticut Association of Boards of Education) survey on educational technology implementation reports that 67 percent of schools districts have no school based LAN connectivity. Educational technology integration into the curriculum is reported in 94 percent of the districts. After the TLCF funding, the districts appear to have some resources for professional development to integrate technology into the curriculum and for basic computer skills among staff.

ITV programs are broadcast over Connecticut Public Television from 10 a.m. to 12 noon on a contract basis. KnowledgeNet, an ITFS network, offers block feeds of instructional television programs, and also is used for educational programming. The Department of Education has four hours per day over this network, but because it does not reach the entire state it cannot serve as an overall delivery medium. KnowledgeNet has been in place for 10 years.

■ *Connecticut State University (CSU)*

A Board of Trustees governs the Connecticut State University System, composed of four institutions. Each of the institutions pursues its own academic and distance learning programs. Classes are offered in nursing and social work, though no degree programs are available. The key focus for the system is to encourage the use of technology by the faculty in their instruction, to encourage them to be open to using distance learning as a way of making more options available to the students. Within this context, distance education's mission is to make the university's education more flexible and accessible. Coordination and policies relating specifically to distance learning are not in place. Programs are currently institutionally based, and articulation agreements with other institutions follow the normal procedures.

A videoconferencing network among the four CSU institutions connects 11 sites using PictureTel and a Lucent MCU. The system, fully installed in January 1998, will be used for distance learning by fall 1998. The system was first proposed in 1988 as part of a technology infrastructure upgrade proposal. T-1 lines currently connect the campuses through the central office in Hartford, and are being used for videoconferencing. The data and voice infrastructure connecting the four institutions will be upgraded to a public ATM switched network in the next six to eight months, through the statewide contract for services. The videoconferencing will migrate to that system within a year.

- ***University of Connecticut (UConn)***

The University of Connecticut has five campuses in addition to the main campus, the Health Center, and the Law School. UConn operates a PictureTel system among its five regions. An ATM backbone for video and data connections is contracted out with SNET. UConn offers distance learning as a supplemental service to students. Fifteen courses cover all subject matter and average 200 students per semester. The program is expanding slowly, focusing on serving its internal audience. A strategic planning process will release a five-year plan in mid 1998. This plan will focus and guide the development of libraries, computer services, and media applications, including distance learning.

- ***Connecticut Community-Technical Colleges (CCTC) Compressed Video Network***

Three of the twelve community-technical colleges have installed compressed video in the CCTC system. Quinebaug Valley developed a physics course for distance delivery and has used the equipment for meetings. The system awaits the release of bond funds approved in 1996 to be able to install compressed video units in the remaining nine colleges. The system will be used for courses beginning in the fall of 1998. The network currently transmits over ATM at 384 Kbps. Compatibility issues with other institutions call for a change to dial-up over ISDN.

CCIT, the Community College Instructional Television Network, is a public-service, noncommercial cable television channel owned and operated by the Community-Technical Colleges of Connecticut. The network is sometimes used for delivery of credit classes, and also offers outside, nationally distributed programming.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Two factors provide formidable barriers to the effective use and integration of technology for education at all education levels in Connecticut. First, there is a lack of committed resources. Although the state has enthusiastically established various plans and ideas for the integration of technology, recommendations for funding remain unfulfilled. This lack of resources translates into less emphasis on professional development, infrastructure, and hardware--all the components that develop a solid technology foundation. A second factor is the absence of coordination. As the RFP for statewide services illustrates, the state is attempting to remedy the situation, but its higher educational institutions have not been working together to pool resources or even establish standards for interoperability. Institutions are still moving fairly independently on their own initiatives.

As it is unlikely that money will suddenly appear in the state to be invested in educational technology and telecommunications projects, the SDE, DHE, and higher education institutions need to look for alternative ways of funding various technology projects and infrastructure efforts. Such alternative funding should target two areas. First, the funding should support the creation of a much-needed infrastructure and programs that would otherwise go not funded. Second, the monies should also be put towards establishing a credible account of the benefits of educational technology programs, to help the legislature realize the necessity of such investment.

DELAWARE

ACRONYMS AND NETWORKS

- DCET—Delaware Center for Educational Technology
- DEN—Delaware Education Network
- DOE—Department of Education
- DTCC—Delaware Technical and Community College
- FOCUS—Flexible Options for Continued Studies, University of Delaware
- OIS—Office of Information Systems
- OTM—Office of Telecommunications Management, under OIS

EXECUTIVE SUMMARY OF THE STATE

Delaware's small size, in terms of both geography and population, has contributed to the development of a statewide information infrastructure for education. By the end of 1998, all 180 public K-12 schools are expected to have access to the Delaware Education Network (DEN) and the Internet via a T-1 line. The wiring infrastructure has also been laid for other video and cable applications to each classroom, and awaits district and school initiatives that will make use of them. Because school districts do not have to consider infrastructure-related expenses when contemplating decisions for funding educational technology, more money can be directed to educational telecommunications planning that is often overlooked. For example, school districts recently have spent nearly double the state investment on training and equipment.

Despite the progress in the statewide educational telecommunications infrastructure in Delaware, distance learning activities remain sporadic at all levels of education. The University of Delaware has a substantial number of distance education courses for its size, yet most are delivered via videotape. Slow development of synchronous, interactive distance learning in K-12 education is also evident. Although the original plan put forward by the Delaware Center for Educational Technology (DCET) called for an interactive video classroom in every high school by 1998, only 25 percent of the high schools are connected, with no rapid growth projected.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The recent statewide planning efforts for telecommunications stem from strategic plans covering the years from 1989 to 1994. In 1995, House Bill 327 mandated the formulation of a statewide information technology plan, to be updated on a yearly basis. The current plan, *State of Delaware Information Technology Plan*: FY 1998 - 2000 represents the first attempt to reposition planning efforts from a focus on the Office of Information Systems (OIS) to a more inclusive plan that embraces all state agencies.

In 1994, House Resolution No. 27 created the Delaware Educational Technology Committee, which was charged with presenting an educational technology plan that sets specific goals for telecommunications and computer infrastructure in schools. In February 1995, the committee issued its report to the 138th General Assembly, which described a conceptual model for establishing the state's educational network. Based on the committee's and the governor's recommendations, the Delaware Legislature created the Delaware Center for Educational Technology (DCET) in the spring of 1995. The Center is intended to create a modern educational technology infrastructure in Delaware's public schools for the purpose of enabling students, through the use of information technology, to meet the academic standards set by the State Board of Education, and to develop the skills needed by a world-class work force.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Office of Information Systems (OIS) and Office of Telecommunications Management (OTM)***

The Office of Telecommunications Management (OTM) is part of the Office of Information Systems, which reports to the governor's office. OTM is responsible for providing technical advice and assistance to state agencies in the acquisition, installation, testing, and transmission of voice, data, and integrated network services, as well as providing consulting services to state and educational agencies. OTM manages the Statewide Information Transport Network as well as the state's Internet connection.

OIS, in cooperation with other state agencies, sets the direction for the development of information technology in the state, and is responsible for updating yearly the *State of Delaware Information Technology Plan*. Assisted by the Information Systems Advisory Committee and the Information Resources Management Committee, OIS's plan is one piece in the development of the state's Information Technology Enterprise. Each state agency is also required to submit an information technology plan outlining that agency's needs and objectives over the coming three years.

■ ***Delaware Center for Educational Technology (DCET)***

The Delaware Center for Educational Technology was formed in 1995 as a distinct state agency governed by a board of directors. DCET's initial mission was to wire every classroom in every school building with data, voice, and fiber and co-axial cable video lines, which it set out to accomplish beginning in February of 1996. DCET also aimed to provide all the hubs, switches, and routers needed to drive the equipment within the schools and provide the network infrastructure for computer technology. DCET's initial mission and activities will be completed by October 1998.

The next phase of DCET's educational infrastructure project will be the deployment of servers. In addition, DCET is responsible for and will engage in activities related to total project needs and budgets for statewide educational technology projects. DCET is also responsible for the establishment of cost-sharing policies, and the initiation, procurement and maintenance of statewide educational technology contracts. DCET also implements an on-going basis of professional training programs relating to statewide education technology, and provides technical assistance to the DOE for the initiation of system-wide applications including administrative and curriculum development.

■ ***Department of Education (DOE) (formerly the Department of Public Instruction)***
In June 1997, the Delaware Department of Public Instruction became the state's Department of Education, led by a cabinet level Secretary of Education. The DOE assumes responsibility for the management of the information systems supporting public education. Among its more than eighteen information systems are the Delaware Student Information System, Teacher Certification, State Assessment Database, School Choice System, and Delaware Educational Candidates System.

<u>THE PLANS</u>

■ ***Office of Information Systems (OIS)***
The Office of Information Systems oversaw the development of the *State of Delaware Statewide Information Technology Plan*: FY1998 - FY 2000, which represents the first effort at a statewide IT plan. The plan introduces strategies to reinforce and expand the state's wide area network and convert it into a fully capable and robust State Information Transport Network. Building an infrastructure that has a presence in every classroom to meet changing educational needs is also a priority in the state plan. The Statewide Plan will continue to evolve in the coming years to help create an efficient system for using and transferring information.

■ ***Delaware Center for Educational Technology (DCET)***
DCET prepared a Strategic Plan for further implementing and establishing the use of educational technology through fiscal year 2000. This document, released in a working version in March 1997, outlines five categories for continuation: staff development and technology utilization, information retrieval, operations, infrastructure (email, servers), and educational technology management (policy, partnerships, grants).

To determine how best to carry out the strategic plan, the Governor's Educational Technology Committee was formed in the fall of 1997. The 25 committee members include representatives from DCET, OTM, legislators, Governor's cabinet secretaries, the Delaware Teachers Union, PTAs, higher education, Department of Education, libraries, and superintendents. The committee issued its recommendations in January 1998 for continued funding of educational technology projects, and released further recommendations for the Strategic Plan in the following months.

The committee recommended the re-organization of the DCET, where the Governor's Board would have remained and the staffing would have been supplemented by other organizations. Although the recommendation was presented to the legislature, it did not receive any support. Subsequently, the DCET operates in the same manner prior to the recommendation, with the Governor's Board and six staff members working as a separate organization.

The DCET wiring project provides five lines into each classroom: an Ethernet data line (the only one which will be made operable by the state), one Category 5 telephone line, two fiber strands, and one co-axial cable line. The use of the latter four lines will be dependent upon initiatives within the individual schools and districts. The project is scheduled to be completed in October 1998, and it is anticipated that it will finish about $4 million under the $30 million budget originally anticipated. The remaining funds will be allocated to the purchasing of servers for the schools.

■ ***Department of Education (DOE)***

In general, information management related issues occupy much of the Department of Education's involvement in technology. Senate Bill 275 of the 138th General Assembly required the DOE to develop School Profile Reports every year, beginning in November 1997. The profile reports contain information about schools including student enrollment, race, and ethnicity, staffing ratios, class size, student achievement, and promotion and attendance. To meet the goals of information dissemination and access, the DOE is developing an interactive system for deployment on the Internet. Cost sharing among state and local funds, and providing schools a sliding fee scale for equity considerations also appear in the DOE's planning.

■ ***E-rate***

A Universal Service working group composed of members from OTM, DCET, DOE and others is taking the lead in filing state level applications for Universal Service Funds. The group aims to recover some of the costs associated with transmission through Bell Atlantic, and to help fund the remaining internal wiring and T-1 line services currently being installed by DCET.

THE FUNDING SOURCES

■ ***Basic Education Connection Program (Bell Atlantic)***

Inspired by the *Delaware Telecommunications Technology Investment Act of 1993*, Bell Atlantic has pledged to invest at least $250 million for a fiber-based network linking schools, hospitals, and government offices at no cost. This will be accomplished over the next five years through the Basic Education Connection program, which was established by Bell Atlantic in 1995. Part of this program is to have all these entities' central offices linked to the network as well as to have ISDN available to all customers in 1996 and digital switches deployed to all Delaware telephone offices by 1998.

Bell Atlantic–Delaware and the Delaware Center for Educational Technology have sponsored 3:1 matching grants. These grants provide funding of up to $15,000 for programs implementing creative and innovative ideas that use technology and the statewide telecommunications network to achieve state guided content standards. The focus and funding is directed toward teachers for development and implementation of a technology-enhanced unit.

TECHNOLOGY

■ *University of Delaware (UDe)*

The University of Delaware is slowly changing its focus to the Internet as its platform for delivery. The university is also using the Internet to enhance the communication and student support services that are possible while taking a distance learning course. Videotape delivery will continue to be the preferred method of delivery within the system over the next several years.

UDe's first fully Internet-based course began its pilot phase in January 1998. The course, called Internet Literacy, is being distributed and licensed through an agreement with PBS and its affiliates. A faculty member, while working on the course, developed a software platform called SERF that will help with administration and creation of online courses.

The Flexible Options for Continued University Studies (FOCUS) is a videotape delivery system for distance learning and is fully funded by the tuition of University of Delaware students who receive credit at the undergraduate and graduate level. The university offers 90 credit and 30 non-credit courses via videotape to more than 2100 student registrations per year. The university also produces and uplinks graduate engineering courses for the National Technological University. UDe also works with JEC College Connection (formerly Mind Extension University) for delivering courses via videotape.

A fiber optic link for two-way interactive video has been established between University of Delaware sites in Newark and Lewes. The Georgetown Higher Education Building is also linked to the Newark campus. Although the interactive video system is used primarily for inter-campus offerings, the University is open to the idea of connecting with high school sites. Graduate education and nursing courses are offered on the Georgetown-Newark link through two-way video.

■ *Delaware Technical and Community College*

Three of the four campuses of Delaware Technical and Community College, the only community college in Delaware, offer distance learning. The College, which hosts credit and non-credit teleconferences, has a DS-3 network operating on the three campuses to teach credit courses. Fifteen telecourses are purchased through PBS and converted to a videotape format, and another eighteen are produced by the college. The college also works with seven higher education institutions to support bachelor's level courses on behalf of corporate clients. The campuses provide uplink and downlink site capability, video distribution, and e-mail access. Corporations with headquarters in Delaware such as DuPont, Gore, Rudel, Mannington Mills, and Bell Atlantic are seeking the college's assistance for Internet training and the construction of Web pages. The college is also developing its semiconductor process technology program for asynchronous delivery via video-based and web-based formats.

■ ***Interactive Video Networks***

Delaware hosts 19 school districts, which include 30 public high schools in the state's three counties and a total of 180 public schools. Bell Atlantic distance learning labs have been installed in eight public schools. The eight schools have used these labs to form three mini distance education programs: three schools in New Castle County Vo-Tech district work together, three others in New Castle County's Christina School District cooperate, and two labs in Kent and Sussex Counties collaborate. These labs involve four points to multipoint configurations for full motion video on fiber connections through Bell Atlantic.

Distance learning as a means of instruction is in its fourth year at New Castle County Vo-Tech. A maximum of 20 - 24 students at all three sites is maintained. High transmission costs for the network (over $1300 per month) create a barrier to its utilization. A movement to lower the cost in order to increase the use is taking shape.

■ ***Delaware Education Network (DEN)***

The internal school-wiring infrastructure installed by the Delaware Center for Educational Technology is connected to the Delaware Education Network (DEN), which the state operates through the Office of Telecommunications Management (OTM). T-1 connections to each school building are leased through Bell Atlantic to converge at the OTM, where the Internet connection takes place. The State of Delaware manages and provides these services, including the contracts with Bell Atlantic.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

In the past, Delaware, like many other states, struggled with the fact that its educational technology projects were driven by funding, instead of educationally derived. To offset this, Delaware took the approach of providing an infrastructure first, so that educational technology decisions can be freed of the burden of infrastructure-related considerations. Yet cost effectiveness still remains the largest obstacle to the development of distance learning at the K-12 level. Even though the 1995 plan that created the Delaware Center for Educational Technology pledged to have a distance learning lab in every high school in the state, only about 25 percent of the high schools have a lab. The realities of the equipment expense, as well as maintenance and transmission costs, have frustrated schools' attempts to use technology more frequently. Although Bell Atlantic has aided public school educational technology efforts in Delaware, little assistance has stemmed from the state's community colleges and university. As a university that has relied on instructional video to provide distance learning, the University of Delaware's willingness and ability to develop Internet based courses will be tested over the next few years as it strives to remain competitive with other institutions of higher education, many of which are more facile and experienced in Internet applications.

FLORIDA

ACRONYMS AND NETWORKS

- CCDLC—Community College Distance Learning Consortium
- CCIN—Community College Instructional Network
- DMS—Department of Management Services
- FDLN—Florida Distance Learning Network
- FDOE—Florida Department of Education
- FEED—Florida Engineering Education Delivery System
- FIRN—Florida Information Resources Network
- STIA—School Technology Incentive Awards
- SUNCOM—Florida's statewide telecommunications network
- UCF—University of Central Florida
- USF—University of South Florida

EXECUTIVE SUMMARY OF THE STATE

Florida has developed an extensive, though independently organized, infrastructure to promote distance learning efforts. State statute, however, provides for the development, design, and maintenance of the statewide advanced telecommunications SUNCOM network. The state further supports the local access to this network through annual appropriations to individual institutions in excess of $1 million. State funding of technology efforts for K-12 schools through the School Technology Incentive Awards has been steadily increasing for the past several years. The Florida Information Resources Network (FIRN), through State of Florida SUNCOM contracts, provides access to the Internet for schools.

Higher education institutions' coordination efforts have faced service area disputes and funding competition, although some progress is noticeable. The University of Central Florida (UCF), by means of unqualified institutional support, has quickly developed an extensive World Wide Web based distance learning program, with a unique focus and goals as well as a distinct approach to administration. UCF offered its first world wide web based course in the summer of 1996. The program may become a model for Florida institutions as well as the nation.

The Florida Community College Distance Learning Consortium (CCDLC) has provided leadership for collaboration among postsecondary institutions in Florida. The 28 community colleges, working together since 1996, have already removed some of the service area barriers to distance learning, and succeeded in getting funding for system-wide infrastructure development.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Distance learning has played a prominent role throughout Florida's educational communities for many years. The Florida Information Resources Network (FIRN) has served K-12 educational needs since 1982. The FEEDS program, a collaborative graduate engineering program among the Board of Regents institutions, has been delivering instruction for over 15 years. The University of South Florida, meanwhile, has offered telecourses through its Open University for over 30 years.

These distance learning efforts, however, have historically been independent and institutionally based. Each of the Board of Regents institutions has its own distance learning agendas. The K-12 sector has also developed regional infrastructures, which are interconnected through the Statewide SUNCOM advanced telecommunications network. Planning efforts initiated by the legislature have not been effective: the Florida Remote Learning Service was replaced by the Florida Distance Learning Network (FDLN) in 1995 in an effort to deregulate local access and coordinate the distance learning initiatives of the education, health, and library communities.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***State Technology Council***

The State Technology Council is a high level, strategic planning committee anchored in the governor's office, and includes the participation of the director of the governor's Office of Planning and Budgeting, State Comptroller, Commissioner of Education, Secretary of State, Department of Management Services (DMS) Secretary, appointed positions of two agency heads, and senate and house of representatives appointees. This Technology Council is advised by the Chief Information Officer (CIO) Council, which is composed of the CIO of each of the state agencies.

■ ***Department of Management Services***

The Department of Management Services' (DMS) Information Technology Program, as directed by statute, has collected the technology plans of over 6,000 education, health, and library institutions. Additionally, DMS has provided technical and engineering support to these entities since July 1997. However, it does plan for state agency telecommunications needs, and through legislation passed in 1995 was given the authority to negotiate rates for public educational institutions. The result of this planning and support effort has resulted in the upgrade of the SUNCOM network to the statewide ATM broadband network. DMS also manages the SUNCOM network, which collectively provides state telecommunications services, and the state of Florida satellite transponder.

■ ***Florida Department of Education***

The Florida Department of Education (FDOE) provides program oversight, management, and resources in educational technology through its Office of Educational Technology (OET). OET consists of three sections: ❶ Instructional Technology, ❷ ITV and Distance Learning, and ❸ Public Broadcasting. The recently added distance learning function will utilize the network of instructional television coordinators already assembled through the former ITV office. Planning and coordination have been decentralized in the K-12 sector over the last three years. Florida districts are very much in control of their own educational programs, including the implementation and use of technology for instruction. K-12 distance learning will be coordinated through district ITV and Educational Technology contracts. Responsibility for training is being relocated to the control of the local districts.

- ***Board of Regents***

The Florida Board of Regents (BOR) acts as the governing and coordinating body for the 10 Regents universities in Florida. Each of the universities operates independently within its traditional service area. Policy regulations released in September 1996 outlined procedures for offering electronic courses with a physical presence in another institution's service area. As guided by the *Memorandum of Understanding*, community colleges are primarily responsible for lower division distance learning instruction, while the universities focus on upper division instruction. With the large anticipated growth in postsecondary enrollment, it is likely that there will be ample enrollment for all postsecondary institutions. A new chancellor for the BOR has recently been named, which may affect the way the system approaches distance learning.

- ***Florida Public Post-secondary Education Planning Commission***

The Florida Public Post-secondary Education Planning Commission is loosely tied to the Florida Department of Education. The Commission performs policy research for legislators and the cabinet, and submits a state master plan for post-secondary education every five years. Although the Commission has no governing authority, it advances recommendations, makes comments on budgets, and approves state contracts. The Post-secondary Education Planning Commission has recommended that the Board of Regents and the State Board of Community Colleges should eliminate any policy that restricts student access to instructional courses and programs using distance learning technologies. Issues preventing the development of effective learning systems need to be resolved, as Florida systems will experience an increase in excess of 200,000 more students by 2010.

- ***Florida Distance Learning Network***

The 1995 legislature created the Florida Distance Learning Network (FDLN) as the coordinating group for distance education initiatives and funding. The 17-member Board of Directors includes representatives of industry, libraries, health centers, public post-secondary, K-12, and private higher education. FDLN takes primary responsibility in the state for facilitating all types of technology programs, and approvals, overseeing accountability, and distributing funds. The FDLN also sets policy for the use of the satellite transponder.

Two groups spun off of the FDLN in the latter part of 1996 to help coordinate planning for their respective educational arenas: The Institute of Public Postsecondary Distance Learning and the Office of Policy for Distance Learning in Community Colleges, which was later adopted in statute by the State Board for Community Colleges. These groups have no funding authority or legislative initiative powers, but establish the leadership for their respective members. The Institute of Public Post-secondary Distance Learning plays an advisory role to the FDLN.

The Institute has four university and four community college representatives, and also includes the director of community colleges, the Secretary for the Department of Management Services, and chancellor of the state university system on its committee. Its efforts focus on coordination, research, grant proposal, and development of a catalog of Florida courses and programs.

■ ***Community College Distance Learning Consortium***

A 1996 statute created the Community Colleges Distance Learning Consortium. As an advisory committee to the State Board of Community Colleges, they coordinate the establishment of a technology delivery system and efforts in distance learning among the colleges. The Consortium includes two members of the State Board, two community college presidents, and one representative from each of the 28 community colleges in Florida. The State Board of Community Colleges provides the policy oversight for the community colleges, though each college is governed independently at the local level. Funding for state institutions and community colleges is performance based, not FTE based, which encourages collaboration in the distance learning environment.

Since its inception, the Consortium has worked rapidly and effectively to create an out-of-district distance learning policy for regional, statewide, and the Southern Regional Education Board's Electronic Campus delivery of programs, established statewide distribution of telecourses, compiled a central catalog of courses, and planned for the implementation of a community college instructional network. The idea for the consortium originated in the institutions themselves, in order to focus resources among the colleges, is also address equity considerations among very different population distributions and demographics.

THE DRIVING FORCE

Both higher education and K-12 institutions operate and dictate their own technology and telecommunications related educational programs. Similar to many other states, the distance learning environment in Florida is politically sensitive.

THE PLANS

■ ***Florida Distance Learning Network***

The legislature is due to reevaluate the composition of the FDLN board. Post-secondary education representatives have voiced an interest in disbanding the FDLN, as it interferes with their ability to act directly on their individual plans.

■ ***State Satellite Network***

One of the two channels on the state's satellite transponder will be converted to digital, possibly during 1998. There are also 106 digital satellite receivers from a 1996 appropriation to be installed by October 1998. FDLN has also proposed to use the transponder fees to increase the number of downlinks in the state. There is anticipated growth in the use of satellite, which may be enhanced by the migration to a digital channel.

■ ***State Universal Access Rate***

The Advanced Telecommunications Services (ATS) program, a statewide universal service initiative, has established a $20,000 credit for communications service connections, as well as reduced rates capped at the statewide average for telecommunications charges to educational institutions, libraries, and health care providers. The Department of Management Services, Information technology Program negotiated reduced rates with the state local exchange companies as well as over fifty related services and product contracts.

■ ***Statewide Student Advisory System***

A grant of approximately $21 million from the governor's office created a Statewide Student Advisory System. This controversial project originated from a discussion stemming from "Time to Degree" legislation, which questioned the variable credit requirements at different institutions for the same degree, and concern for the capabilities of the SASS and SOLAR systems. A pilot project has been completed and the technology proven for a system to enable the automated statewide advising on college programs and degrees. Financial aid, registration, and other student services will eventually be integrated.

■ ***K-12***

The School Technology Incentive Awards (STIA) have promoted and supported the effective use of technology in K-12 schools in Florida since 1993. Funded at $55 million in the first three years of the program, and $65 million in 1996-97, over 75 percent of the equipment funds have been dedicated toward hardware, including computers. Training allocations were also made. Technology appraisals and plans were required in 1996-97, to be reviewed by the FDLN and approved by the FDOE prior to the release of funds. Eighty million dollars was allocated for the program in 1997-98 and for 1998-99.

■ ***E-rate***

FDOE assumes responsibility for disseminating information and helping school districts with their applications for E-rates. There is also a request for $28 million in state support of E-rate discounts to cover local phone and local loop District Area Network telecommunications charges, for retrofit networks for the schools, and to act as emergency funds in case a district does not file on time.

■ ***Community College Distance Learning Consortium***

A sense of collaboration permeates community college distance learning activities. The general educational mission of the colleges has not changed, but the nature of statewide delivery has been modified. The colleges are being encouraged to find niche programs to develop and offer statewide. The collaboration not only increases access to educational opportunities for the students, but also allows collaboration of student services. Performance based funding helps direct these institutions toward greater collaboration, as they are not competing for students to increase funding levels.

A Community College Distance Learning Course Catalog lists all distance learning courses currently offered by the community colleges. There are already over 1000 courses covering the fall 1997 and spring 1998 semesters, and some student services will be integrated soon. The CCDLC has addressed geographic service areas, which has permitted the statewide delivery of courses leading to five A.S. degrees since March 1997. The next step toward completely easing the service areas with respect to distance education should be accomplished by the fall of 1998.

The Community College Instructional Network (CCIN) is an initiative developed by the CCDLC to establish an infrastructure connecting all 28 colleges for statewide distribution of distance learning courses and programs. The initial focus will be to create a video conferencing network connecting 132 eligible facilities. This network primarily runs over the state SUNCOM network using broadband connections into each institution. Such a network will allow point to multi-point connections as well as connections to cable headends, a satellite transponder, and an ITFS system. The legislature initially has appropriated $700,000 towards the purchase of video conferencing equipment, and additional funds have been requested.

THE FUNDING SOURCES

The Community College Instructional Network effort has received $700,000 in state funds for video conferencing equipment, which translates into $25,000 per institution as a matching grant program. Other funds have not been appropriated specifically for technology, infrastructure, or distance learning efforts in higher education. However, the legislation has appropriated funds to enhance the state SUNCOM network through an initiative called mini-nodes. Mini-nodes are being designed to directly support the education community. Fifteen million dollars was appropriated for development of the Statewide Student Advisory System.

The School Technology Incentive Awards (STIA) have been the primary source of K-12 funds for technology.

TECHNOLOGY

■ SUNCOM

SUNCOM is the all digital fiber backbone interconnecting 11 nodes and providing data, voice, and video services for the state. Frame relay services are overlaid on the SUNCOM network, provided through agreements with ICI, which also enables the use of compressed video. Migration will begin in May 1998. There are 50 sites directly connected to the SUNCOM network for video, consisting mostly of community colleges and universities, though also serving state agencies and some high schools. The SUNSTAR satellite network is no longer in operation due to budget cuts. This network referred to the uplink facilities at Tallahassee and the downlinks available at all the community colleges.

- ***Florida Information Resources Network***

The Florida Information Resources Network (FIRN) provides statewide Internet and educational interconnectivity through a frame relay network overlaid on the SUNCOM backbone. The legislature appropriates funds on a yearly basis to maintain free Internet access and local loop service to the district offices, usually via a T-1 connection. The service is used by higher education, K-12 schools, libraries, and private schools. Network services maintain four Internet PoPs, to be expanded to five or six in 1998. Services of FIRN are divided into application development, network development, and network technical-administrative support.

- ***State Satellite Infrastructure***

The two analog channels on the Florida Transponder are owned by the state and managed by the Department of Management Services and Florida State University public television. Six uplinks exist throughout the state, mostly at higher educational institutions. Satellite provides class material primarily for universities and community colleges, although there are some other uses in K-12 as well as state legislature, administrative, corrections, and health sectors. Analog downlinks are present in almost every K-12 district.

Although there is increased use of the satellite, which may be enhanced by the migration to a digital channel, those sites that are using it are making use of the infrastructure that is present. Indian River Community College, for example, uses a full broadcast signal out and compressed video in for two-way interactivity. The FEEDS -USF master's in Engineering program also uses a hybrid of technologies, relying on satellite delivery. The FDOE maintains and funds satellite services as a large distribution broadcast mechanism to reach the school districts, as well as for training out of the FDOE.

- ***Instructional Television***

Each K-12 district operates its own independent distribution system for Instructional Television (ITV) services. These frequently operate through ITFS, but also via cable and closed circuit TV. ITV services for schools, community colleges, and universities are supported through the ITV and Distance Learning section of the Office of Educational Technology. This office provides program selection, acquisition, duplication, and distribution services. The ITV system has 67 district system coordinators.

- ***Higher Education***

Generally, each of the Regents institutions has not only pursued its own distance learning program, but also has managed its own local infrastructure while interconnecting through the SUNCOM network. The institutions make use of state owned resources such as the transponder, as well as develop their own regional ITFS and compressed video infrastructure.

ITFS connects approximately 100 sites in the state, and compressed video locations also number over 100 statewide. Several of the universities are collaborating with the Department of Management Services to develop FloridaNet, which will utilize the SUNCOM high speed, high bandwidth statewide Internet2 ATM services.

- ***Florida Engineering Education Delivery System (FEEDS)***

The Florida Engineering Education Delivery System (FEEDS) is a collaborative effort among the University of Florida, Florida Atlantic University, University of Central Florida, Florida International University, University of South Florida, and Florida A&M - Florida State, to provide graduate instruction in engineering statewide to both academic and corporate sites. The program, offering master's degrees in over 12 disciplines in engineering, has been in existence for about 15 years. FEEDS depends on the available technology and infrastructure for delivery of courses, utilizing primarily one-way video.

- ***Florida State University***

Florida State University's Center for Academic Support and Distance Learning (CASDL) has taken the lead with assisting faculty, departments, schools and colleges within the University's system with migrating existing courses toward more asynchronous, web-based delivery models. The College of Arts and Sciences, School of Business, College of Engineering, College of Law, School of Social Work give evidence of this in their utilization of Web-pages to facilitate traditional classroom instruction.

In addition, Florida State University's Center for Professional Development and Public Service utilizes interactive video and World-Wide-Web technology to deliver courses to off-campus students enrolled in their Masters in Information Study program.

- ***University of South Florida (USF)***

USF historically has had one of the largest distance learning programs in Florida in terms of enrollment. There are over 10,000 enrollments per year in 260 courses, including 100 Internet courses, 100 asynchronous video and videotape, and 60 synchronous video courses. Courses have traditionally relied upon one-way video, two way audio, using synchronous group-based broadcast instruction among the main campus, three regional campuses, and a number of corporate sites. The Open University has also offered telecourses for over 30 years via broadcast over the public broadcasting station, WUSF. USF has diversified its offerings in recent years to include World Wide Web-based and video conferencing instruction delivery mechanisms.

There are currently no complete degree programs over the Internet, but the interdisciplinary undergraduate completion should be available by the fall of 1998, with other graduate degrees to follow. Graduate degrees in library science and public health, in addition to the FEEDS program, are also offered via distance education. With the exception of the degree programs, most courses offered via distance learning serve a region.

The Educational Outreach Department of USF was officially created in September 1997, with the merger of the Distributed and Technology Mediated Learning and Continuing Education Departments of the university. Educational Outreach supports college-based programs with access to the network, student support, and a centralized catalog. A faculty support initiative called VITAL, Virtual Instructional Team for Advancement of Learning, is an effort supported by all organizations on campus involved in distance learning. This pilot project is an effort to provide necessary faculty support and guidance through a pool of existing resources. The Teaching, Learning and Technology Round Table also provides grassroots faculty involvement at USF.

USF, FIU, FAU, and UCF share faculty in a program called LinguaNet, offering higher level language courses over two way compressed video. There is a T-1 leased connection between UCF and USF. Other connections are made through dial-up services.

■ ***University of Central Florida (UCF)***

Distributed learning has been worked into the fabric of the university, having been given full institutional support by its administration. Centralized support mechanisms have been created for faculty and program development, while leaving the actual development decisions to individual departments and the five colleges. Regular courses use technology as significant components for instruction.

Courses are primarily offered over the World Wide Web and through interactive two-way compressed video. There are four full degree programs, bachelor's, and master's degree programs. Bachelor and master's degrees are offered in vocational teacher's education as part of a statewide service to vocational schools. There are approximately 100-120 students per term in this program. A bachelor's degree is offered in Liberal Studies, with minors possible in a number of disciplines. There is also a RN to BSN degree primarily offered in the UCF region, with plans for offering it statewide soon. Undergraduate students must be enrolled in the university, and bachelor's programs offer only upper division courses toward the degree, so as not to compete with community colleges. Several community colleges are contemplating offering A.A. degrees using the UCF model. Courses are not offered on the web unless they are part of a degree program. There is also a graduate program for a master's degree in Chemistry-Forensic Sciences, delivered for the National Center for Forensic Research completely over the world wide web with the exception of a two week intensive course on campus in the summer.

Compressed video connects the four branch campuses of UCF (downtown Orlando branch, South Orlando, Brevard CC, Daytona Beach CC), with a possibility of expanding to two or three other sites through agreements with community colleges. Leased T-1 lines link the campuses, and transmission is at 768 Kbps. The compressed video is used to support programs already offered at the branch campuses.

Approximately 20 course sections are offered via the World Wide Web each term, serving 500-600 students. There are also another 23 sections of web enhanced programs run through the Center for Distributed Learning, affecting another 3,000 students. A distributed learning initiative utilizes web based and enhanced courses with instruction for students and classes normally given on campus. The web courses were taken as a matter of convenience and lifestyle. An on-campus initiative encourages the use of media enhanced courses to develop instruction in large lecture classes, increase student retention and learning in low enrollment/ high dropout rate/high failure rate courses, and resolve space problems by reducing lecture and face-to-face class time.

UCF's approach is successful thus far in part because of the faculty development efforts, and the emphasis on creating the learning environment. UCF is currently working on a campus wide *Distributed Learning Long Range Plan*, to guide the direction of technological infrastructure, personnel, and student support.

- ***Community Colleges (CCDLC)***

Although the Internet is likely to be the focus around which the community colleges will develop their distance learning programs in the long term, current efforts make use of video and video conferencing, ITFS, cable distribution, and other mechanisms that are currently available. K-12 dual credit courses are offered through many of the community colleges via distance learning.

OTHER MISCELLANEOUS BUT RELEVANT INFORMATION

The University of Central Florida is one of 11 institutions in the IMS - Instructional Management System program that gathers broad based institutional support. UCF is also a testbed for the Advanced Distributed Learning Initiative (ADL), out of the Department of Defense. The ADL was started as an initiative to help coordinate advances in distributed learning for use in military training that would be platform independent.

Florida State University and the community colleges of Florida are developing plans to deliver baccalaureate degrees and graduate programs through a distance learning initiative modeled after the Open University in the United Kingdom. Programs of study will be delivered via the World Wide Web, and will utilize materials that have been developed by Florida State University, the community college system of Florida and the Open University curriculum.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

The statewide student advisory system for post-secondary education offers enormous possibilities for preparing a unified administrative support system for students. If the institutional details that provide the most difficult obstacles to collaborative distance learning are worked out through this program, the state will be primed for easy inter-institutional implementation of distance education programs and courses. The community colleges are also already well on their way to helping achieve this.

The University of Central Florida's distributed learning program is interesting in several respects. First, it demonstrates the growth possibilities at an institution when given sufficient administrative support. This has also enabled the balance between centralized development support services and decentralized program development at the institution. Second, UCF's distributed learning efforts are guided by an overarching mission to provide distributed learning resources as a way of attaining a degree. Finally, it is implementing creative and forward thinking uses of technology for instruction on-campus.

Lest other states become too envious of Florida's vigorous distance learning activities, careful attention should be directed at the state's educational technology expansion. That is, the creation of organizations weighed down by cumbersome and unwieldy memberships can plague planning efforts. Planning activities may be further complicated by the institutional desire to hold on to autonomy with respect to distance education. The Florida Distance Learning Network, which replaced the Florida Remote Learning Service in 1995, now has to oversee two additional planning groups for post-secondary education, and in 1998 will face a challenge to its makeup by the state legislature.

GEORGIA

ACRONYMS AND NETWORKS

- DOAS—Department of Administrative Services
- DTAE—Department of Technical and Adult Education
- GCATT—Georgia Center for Advanced Telecommunications Technology
- GPB—Georgia Public Broadcasting
- GSAMS—Georgia Statewide Academic and Medical System
- GSTP—Georgia Statewide Telemedicine Program
- ITPC—Information Technology Policy Council, under the Governor's Office

EXECUTIVE SUMMARY OF THE STATE

Georgia can legitimately boast of an impressive and still expanding infrastructure that is well used by education for distance learning and educational technology. Through the statewide GSAMS, GALILEO, PeachStar, and PeachNet networks, students of all ages have access to education, information, and health care, thanks to important and consistent (relative to other states) funding. What remains, however, is for the state to make strides towards efficiency and interoperability among these systems. Over the last two years, agencies and institutions involved in educational telecommunications and technology throughout Georgia have begun to address questions of redundancy and costs in their internal and collaborative planning.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Since the early 1990s, Georgia has worked to build an impressive telecommunications infrastructure for education. The state has been able to create a foundation for educational telecommunications primarily through two funding sources. First, in 1992, the state's Public Utilities Commission dedicated Universal Service Fund monies obtained through a telecommunications overcharge. Furthermore, public education benefited from a portion of these funds in the *Georgia Distance Learning and Telemedicine Act of 1992* (Senate Bill 144). Among other outcomes, the Act established GSAMS, the Georgia Statewide Academic and Medical System, which has become a well-known educational telecommunications network. Technology in Georgia's K-12 schools, institutions of higher education, and public broadcasting also receives a boost from the state's lottery funds. State lottery funds have supported one of the more recent statewide initiatives sponsored by the University System of Georgia, the Georgia Library Online network, known as GALILEO.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Information Technology Policy Council (ITPC)***

The ITPC was formed out of the governor's office in 1995 as part of a mandated initiative to combine the technology and telecommunications infrastructure resources in the state. Because different entities in the state at different times established different telecommunications and information initiatives, a rather disaggregated set of services resulted. To prevent redundancy and inefficiencies in the systems, the ITPC deals with the functionality of the distance and interactive learning networks. Membership on the ITPC includes the Department of Administrative Services (DOAS), the Department of Education (DOE), the Department of Technical and Adult Education (DTAE), and the University System of Georgia.

■ ***Office of Information and Instructional Technology (OIIT)***

The Office of Information and Instructional Technology is located within the University System of Georgia, a system that includes 34 state-funded institutions. OIIT includes the Office of the Vice Chancellor and three main functional areas: Information Technology; Virtual Library, Customer and Information Services; and Distance Education and Academic Innovation. OIIT is charged with implementing system-wide policies and planning procedures, providing electronic data processing reviews, and developing and operating required central services, including networking, administrative application, academic services, and computing facilities.

■ ***Department of Administrative Services (DOAS)***

Department of Administrative Services (DOAS) is one of 56 agencies in Georgia state government. The budget of $300 million per year comes from providing products and services to other state agencies, colleges and universities. DOAS is largely user-funded, by providing low cost and affordable services to its customers. DOAS' services range from insurance to communication to mail and courier.

To meet today's technological challenges, DOAS has merged with the former Telecommunications and Computer Services divisions to create a new information technology entity. Within information technology, Customer Account Management is responsible for business strategy management. Technology Service is responsible for customer and financial system solutions. Technology Product Management is responsible for computer center operations and systems support, communications and data systems, system security and special tools, and help desk. Technology Strategies is responsible for research and development, product planning and development, and the Georgia Statewide Academic and Medical System (GSAMS). These four entities work together to ensure the efficient delivery of information technology products and services.

■ ***Georgia Department of Education (DOE)***

The Georgia Department of Education stands apart from its counterparts in other states because of the network of partnerships it has successfully launched with a number of institutions, agencies, and distance learning providers in the state. The DOE works closely with Georgia Public Television to deliver instructional programming to K-12 schools. DOE also cooperates with the Department of Administrative Services and the University System of Georgia to enable schools to have access to the GSAMS, PeachNet, and GALILEO statewide networks.

■ ***Georgia Public Telecommunications Commission (GPTC)***

The Georgia Public Telecommunications Commission (GPTC) delivers public broadcasting and instructional television to K-12 and higher education institutions. Georgia Public Television (GPTV) is housed within GPTC and is responsible for providing programming to education sites throughout the state. GPTV also oversees the PeachStar Education Services, which provides instructional programming via satellite to K-12 public schools, universities, colleges, technical institutes and regional libraries throughout Georgia. PeachStar Education Services produces its own programming and purchases distance learning instruction and staff development. For many years, GPTV has actively participated in the multi-state SERC consortium.

■ ***Distance Learning and Telecommunications Governing Board***

The Distance Learning and Telemedicine Governing Board oversees the expenditures of the Universal Service Fund. In 1992, the legislators allotted $70 million dollars to the Telecommunications Governing Board, which was comprised of members of all the education agencies, human resources, correction and other state agencies. Presently, the board is inactive because the $70 million dollars has been exhausted.

■ ***Department of Technical and Adult Education (DTAE)***

The Department of Technical and Adult Education includes 33 technical institutes, 17 satellite campuses, and technical programs at four state colleges. In 1995, DTAE and the University System of Georgia decided to pursue a closer working relationship; one outcome of the collaboration has been the participation of DTAE sites in the GSAMS network. DTAE is also involved in the University System's GALILEO initiative.

■ ***Georgia Center for Advanced Telecommunications Technology***

GCATT is a think tank for technology issues emphasizing economic development, but also focusing on education, health care and human services. GCATT has been working to design a statewide network to comprehensively serve the telecommunications transport needs of the state in data, voice and video. Education is not directly involved at the infrastructure level, but will be included in the applications of the infrastructure.

THE DRIVING FORCE

Individual initiatives have manifested themselves in Georgia as the opportunity has arisen, lending themselves to the development of impressive, yet disjointed infrastructure and programs for educational technology and distance education. Governor Zell Miller has pushed for greater connectivity through the GSAMS network, and was also instrumental in committing funds from the lottery to distance education projects. There has also been a small effort in the last several years toward integrating the services achieved through the various networks.

THE PLANS

K-12

In late 1997, the Department of Education (DOE) updated its *Statewide Educational Technology Plan*. The Plan documents the process the DOE undertook to assess the state's current educational status and needs, develop a vision, determine the design features of a comprehensive support system, and consider the components needed to serve and support the state's educators and students. The Department of Education articulated three technology priorities: local technology planning focused on improved teaching and learning, professional development for curriculum integration, and connectivity within the department and among school districts.

In 1997-98, the DOE focused on fostering the utilization of technology to enhance the instructional process through its Classroom Technology Project, which was supported through a Georgia lottery grant. Local schools and school districts were free to spend the funds on all instructional areas, including special education, gifted classrooms, fine arts, physical education, and vocational education.

E-rate

The Department of Education has put together a well-organized online document for schools and school districts about the E-rate, including an application timetable. All Georgia public schools have written technology plans which have been approved. It is the responsibility of schools and school districts to pursue the reduced telecommunications rates.

University System of Georgia

In late 1997, the Office of Information and Instructional Technology (OIIT) announced a new organizational structure and described three major goals it will focus on. First, OIIT will seek to foster universal access to information and learning for the citizens of Georgia, using traditional approaches and distance learning technologies. Second, OIIT will strive to encourage the creation of an international electronic crossroads for commerce, and an economic climate so that even rural businesses can compete with national and international counterparts. Finally, OIIT will focus on deploying the best supporting systems possible to respond to the management of information needs, customer service requirements, and administrative processes of all units within the University System. To meet these goals, OIIT will work with the library system to develop GALILEO, prepare PeachNet for future applications, provide the University System with the necessary human and technical resources, encourage the integration of technology into the curriculum, and collaborate with unite throughout the University System.

Two recent University System of Georgia committees have considered the far-reaching implications of distance learning within the state's higher education institutions. In 1994-95, the Ad Hoc Administrative Committee on Distance Learning and Instructional Technology (DLIT

Committee) focused on the development of plans and policies for the effective use of technologies. The DLIT Committee issued a final report that contained its recommendations in the spring of 1995. In 1997, the Chancellor appointed a committee of distance learning representatives from across the University System to define further distance learning policy and procedural issues. Included in the Distance Learning Committee's April 1997 report were recommendations to have the Chancellor articulate a vision and goals for the effective and efficient use of distance learning and technology within the University System. The committee also recommended that a Vice Chancellor for Educational Outreach position be created to address the myriad responsibilities associated with coordinating the University System's distance education efforts.

Numerous system resources have been directed towards GALILEO, a system-wide library system. In 1994, $10 million in funding was obtained for GALILEO's development. Still in its early stages of formation, GALILEO will be led by a 19-member steering committee, which will manage the project, recommend strategic direction, prepare budgets, and implement continuous evaluation procedures.

■ ***Medical College of Georgia***

The *Georgia Distance Learning and Telemedicine Act of 1992* set forth a provision to establish a network called the Georgia Statewide Academic and Medical System (GSAMS), a coordinated distance learning and telemedicine network that currently connects more than 450 sites. The Medical College of Georgia was asked to develop, coordinate, implement and manage the Georgia Statewide Telemedicine Program (GSTP). With the Medical College of Georgia serving as its oversight agency, the GSTP links hospitals, health departments, and health care facilities. GSTP will ultimately link 54 telemedicine sites throughout the state.

■ ***Georgia Institute of Technology***

Georgia Tech Center for Distance Learning started in 1977 and currently has 450 students enrolled. Georgia Tech Center for Distance Learning electronically extends its classroom walls to serve students who cannot attend campus classes. Master's degrees in Electrical and Computer Engineering, Environmental Engineering, Health, Physics/Radiological Engineering, Industrial Engineering, and Mechanical Engineering can be sought through distance learning at Georgia Technology. Video cameras record instructor presentations and the videotapes and supporting materials are sent to off-campus students, who participate in classroom activities by watching the taped classes at their home, work or at a designated location.

■ ***Georgia State University***

Georgia State University's concept of "Classroom Earth" is a creation of a virtual classroom using any and all technologies available to bring education to any student, anywhere and anytime. The mission of "Classroom Earth" is to provide leadership to Georgia State University in the implementation of distance learning initiatives;

to provide administrative and academic support for distance learning programs; to provide training in the use of various distance learning technologies and instructional design; and to initiate and to participate in research projects related to distance learning activities for the University and the State of Georgia. Distance learning is delivered via videoconferencing, teleconferencing, web-based resources, film/video/TV broadcast or satellite, CD-ROM production and computer services.

■ ***Department of Technical and Adult Education (DTAE)***

In fiscal year 1997, the number of technical institute GSAMS sites grew from 36 to 45. The DTAE sites logged over 15,000 hours of instruction, with credit courses composing nearly one-half of the programming.

THE FUNDING SOURCES

■ ***K-12***

Technology for K-12 education has benefited from lottery funds. In 1997, public schools were appropriated over $2.9 million for various technology initiatives, which included $250,000 for satellite dishes and satellite technology. In 1998, more than $59 million has been requested from the state lottery funds. Included in these monies are requests for $690,000 to fund technology centers and $36,800 for computers.

It should be mentioned that lottery money supports K-12 education in other ways. Georgia Public Television has received funding for both planning and construction. In a non-technology project, lottery funds support HOPE scholarships for B-average high school and technical students desiring higher education in Georgia. Lottery monies are also directed at funding pre-K programs for children throughout the state.

■ ***Higher Education***

In 1997, the Board of Regents received $28 million for technology from the state lottery fund. The Board of Regents requested a total of $33 million in 1998 for technology-related projects. Included in this figure is $1.6 million, which would support the University System's GALILEO initiative.

Over the past several years, the Department of Technical and Adult Education (DTAE) has also received lottery funds. In 1997, DTAE was awarded $17.5 million, and put in a request for $5.4 million in 1998.

TECHNOLOGY

■ ***Georgia Statewide Academic and Medical System (GSAMS)***

GSAMS is a two-way interactive videoconferencing network connecting more than 370 sites throughout Georgia. The Department of Administrative Services (DOAS) manages the combination distance learning-telemedicine network. The terrestrial network connects every public college and university, every adult and technical school, seventy-three K-12 schools, Georgia Public Television, seven Department of Corrections sites, the Medical College of Georgia, and several resource sites. The high-speed T-1 lines can simultaneously connect as many as twelve sites. GSAMS transmits more than 325 conferences each week, and more than 7,500 hours of instruction each month.

■ ***PeachNet***

PeachNet is the University System of Georgia's statewide, data communications network. Managed by the Board of Regents Office of Information and Instructional Technology (OIIT), PeachNet provides inter-campus communications and access to external computing resources to each of the University System's thirty-four institutions, as well as more than 180 public K-12 school systems, over 200 public and regional libraries, many private colleges, universities, learning centers, museums, and state agencies. Initially tested in 1998, PeachNet's backbone has grown to be an expansive network of more than eighty routers connected via high-speed (56 kbps and T-1) telephone lines.

■ ***PeachStar***

PeachStar Education Services is a division of Georgia Public Broadcasting (GPB) that provides instructional programming via satellite and resources to every K-12 public school, college, university, technical institute, and regional public library in Georgia. Georgia has its own transponder and completed the largest deployment of satellite dishes in the U.S. During the 1996-1997 academic year, PeachStar switched from an analog format to a digital broadcasting format. Each site, with a satellite dish provided by the state, received an IRD, or integrated receiver-decoder, to be able to receive the digital transmission, also known as a Digi2 or MPEG 2 signal.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Along with Texas, Georgia is a prime example of a state that received critical funding early on and parlayed the monies into a system for educational telecommunications and technology. Unlike other states, there is a great deal of collaboration that takes place in Georgia, originating in part from the unique funding sources from which all education-related institutions in the state benefit. As the governor's recent call to coordinate planning indicates, however, the flurry of educational telecommunications and technology activity has resulted in some degree of redundancy and incompatibility. While these roadblocks are problematic and should not be underestimated, Georgia may be able to overcome them relatively more easily than other states because of the closer working relationships that exist between the state's agencies and institutions.

HAWAII

ACRONYMS AND NETWORKS

- HDOE—Hawaii Department of Education
- HECN—Hawaii Educational Networking Consortium
- HERN—Hawaii Education and Research Network
- UH—University of Hawaii

EXECUTIVE SUMMARY OF THE STATE

Both K-12 and higher education have experienced progress in their use of educational technology and telecommunications over the past two years. In the K-12 setting, the *Hawaii Department of Education's* (HDOE) *1995 Plan for Educational Technology* has led to three programs focusing on teacher training: the Telecommunications and Technology for Teachers (T3) program, the Electronic School/HERN Summer Institute, and the Hawaii Technology Literacy Challenge–Internet Training for 21st Century program. The HDOE also stands ready to expand its E-School program into Chicago's public schools during the 1998-99 school year. In higher education, the University of Hawaii Board of Regents released two documents which reveal the key role distance learning plays in fulfilling the university's mission. The *University Strategic Plan 1997-2007* pointed out four university goals that are aided through distance learning. *Executive Policy E3.204, Distance Learning Plans, Policies, and Procedures,* released in May 1998, clarified the university's most recent position on distance learning.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Like many other states, until very recently Hawaii's educational technology and telecommunications initiatives focused primarily on video-based instructional programming. Both K-12 schools and university campuses made frequent use of the state's Hawaii Interactive Television System (HITS), an inter-island microwave network with local ITFS distribution for their distance learning needs. Despite the budget cuts in the past few years, all education entities in the state have become more heavily involved and invested in electronic resources. HDOE currently offers interactive web-based courses in its newly established virtual school, E-School. This fall approximately 30 high school credit courses will be offered to students statewide.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Hawaii Department of Education (HDOE)***

Within the Department of Education, the Office of Information Telecommunications Services (OITS) oversees the various educational technology and telecommunications initiatives. OITS, in turn, is divided into seven branches that contribute to the efforts.

The Advanced Technology Research branch researches and disseminates information on new technologies and coordinates the development of strategic plans for improving the department's use of existing and emerging technology.

The Special Projects branch establishes teams on an as-needed basis to develop and install major new technology applications systems. The Financial Management System Project branch is responsible for the design, development, and implementation of the public school system-wide financial management system. The Information System Services branch develops and maintains application systems, and provides centralized computer services and support using the department's minicomputers and Department of Budget and Finance mainframes.

The Information Resource Management branch develops policies, procedures, standards, and guidelines on information resources, and develops operational plans for the department's information and telecommunication systems and services.

The Teleschool branch selects, produces, and programs instructional television programs, plans for and supports interactive telecommunication systems and services, and assists schools and offices in developing multimedia materials.

Finally, the Network Support Services branch develops and implements statewide voice, data, and video communications systems.

■ ***University of Hawaii (UH)***

The University of Hawaii's distance learning programs continue to advance, with over 70 UH courses in Spring 1998 enrolling over 2500 students using 2-way video, 1-way video, cable television and the Internet. Credential programs being delivered include education, nursing, administration, professional studies, library studies and computer science. Introductory courses in health sciences are also provided. UH is now redeveloping its graduate certificate program in telecommunications and information resource management for global delivery beginning in 1999, and planning for another cohort-based offering of its MBA program via technology.

The University is an active participant in the emergence of the Western Governors University, with significant UH faculty and staff involvement in WGU's academic, administrative, and technical advisory bodies.

In higher education, the University of Hawaii Board of Regents released two documents which reveal the key role distance learning plays in fulfilling the university's mission. The University Strategic Plan 1997-2007 points out four university goals that are aided through distance learning. Executive Policy E3.204, Distance Learning Plans, Policies, and Procedures, released in May 1998, clarified the university's most recent position on distance learning. E3.204 assigns distance learning responsibilities throughout the UH system and eliminates the notion of geographical service area responsibility for program delivery.

Major initiatives in telecommunications include a $3.7 million project to digitize the analog microwave video networks used for distance learning, planning for connections to the Internet2 family of research networks, and a $5 million project to acquire ownership in a fiber optic cable system between Hawaii and the U.S. mainland. UH has also licensed ITFS frequencies to a wireless cable operator in order to expand its coverage and generate revenues to support telecommunication network maintenance and operations.

The Office of the Vice President for Planning and Policy (OVPPP) provides overall coordination of the University's system-wide distance learning efforts. OVPPP is responsible for the continual refinement and updating of UH system distance learning plans, policies, and procedures. Also taking an active role in UH's distance learning is Information Technology Services (ITS), which assumes responsibility for the overall design, development, maintenance, and support of the system-wide telecommunications infrastructure that supports UH distance learning in-state and out-of-state. All proposed appendages to this system, whether supported by general, revolving, special, or federal funds, must be approved by and coordinated with ITS. Within ITS, the Distance Learning and Instructional Technology (DLIT) group is coordinating the distance learning activities of campus media center directors and various originating and receiving site personnel, coordinating Oahu cable access channel scheduling and the distribution of cable programming via HITS, and developing technical standards and coordinating support requirements. The TALENT (Teaching and Learning with Electronic Networked Technologies) workshop program is an outgrowth of the NSF-sponsored HERN project which is drawing to a close. TALENT brings together faculty and staff from throughout the UH system in an intensive workshop to accelerate the development of technology-based courses.

■ ***University of Hawaii Community College Distance Education Committee***

The UHCC Distance Education Committee is a community college system committee composed of administrators, faculty, media center coordinators, librarians, and student services personnel. The Committee is charged with coordinating community college distance learning efforts. Input from this committee is used by and guides the work of the departments within the University of Hawaii involved in distance education.

■ ***Honolulu Community College***

Honolulu Community College offers the Emeritus College, a series of non-credit programs via cable TV targeted specifically for senior citizens in areas such as health, culture, and technology.

■ ***Kapiolani Community College***

Kapiolani Community College offers a non-credit program via Cable TV called "You and the Law," which has now been requested for replay in a dubbed format on the local Filipino channel.

High school students are earning early admittance credits through a Kapiolani Community College course being delivered using Cable TV and the Internet.

■ ***Oahu Community Colleges***

The Oahu Community Colleges are working cooperatively to provide an Associate of Arts degree using cable television as the primary delivery medium. Thirty-five courses have been delivered to date, now serving over 100 student enrollments per year.

THE PLANS

■ ***K-12***

In mid-1995, the Hawaii Department of Education released its *Plan for Educational Technology*, a document which reflects the education reform issues outlined in the federal *Goals 2000, The Educate America Act*. The plan describes the vision and mission for technology articulated by the Goals 2000 Task Force, that all learners in Hawaii will be empowered to fully participate in the global village, and that the Department of Education will design and implement a system that provides universal access to the global village for the state's lifelong learners. The plan outlines seven goals for technology, as well as 31 strategies for implementation and 56 benchmarks.

In October 1996, a joint task force representing the Board of Education and Board of Regents issued its report and recommendations concerning collaboration for educational technology in the 21st century. The task force's report points out that the state's conditions encourage such collaboration. The Department of Education and institutions of higher education have each prioritized developing their technology resources, and there is a history of cooperation between K-12 and post-secondary education through the activity of the Hawaii Educational Networking Consortium (HENC). The task force identified five recommendations, which target providing adequate technology in the schools, interconnecting the educational community within the state, implementing adequate external connectivity between Hawaii and the rest of the world, extending access to educational resources to the home, and providing a safety net through publicly funded libraries for those who would not otherwise be served.

A recent major HENC program has been the issuance of a statewide contract for dialup services which provides residents of every toll area in the state with Internet dialup access at the same low-cost rate regardless of location. HENC is also influential in the development of institutional network infrastructure (I-Net) and is working to improve the integration and level of educational access programming on Cable TV throughout the state.

Since September 1996, the state Department of Education has overseen The Electronic School (E-School), a five-year virtual school project that relies on technology to deliver instruction and includes the cooperation of the Chicago Public Schools. High school students access E-School through the Internet and/or instructional television broadcasts. Videoconferencing facilities of the Instructional Technology Centers are also employed. Videos and CD-ROMs support the content. In its first semester, E-School delivered eight courses to students throughout the state.

During the fall of 1997, seven new courses were added to E-School, which brought the total course offerings to 16 high school credit courses ranging from AP US History to Shakespeare On-Line to Entrepreneurship. Approximately 30 high school credit courses will be offered in the fall of 1998.

One of the E-School project goals is to develop curricula and teaching strategies that are exportable to other settings and communities. To this end, the Hawaii Department of Education has been working with the Chicago Public Schools to develop the E-School learning and teaching environment. Chicago teachers have participated in E-School technology training sessions. During the 1998-99 school year, E-School's virtual courses will be tested in Chicago before they are disseminated to other areas of the country. Note that the E-School project also involves the participation and support of more than 50 corporations in Hawaii and Chicago.

For the past several years, the state DOE has invested considerable resources in technology training programs. The HDOE administers three major training efforts. First, the Telecommunications and Technology for Teachers (T3) program strives to prepare Hawaii's in-service teachers for leadership and/or technology positions to infuse appropriate technology and training into the curriculum, develop a network of resources to provide assistance to schools and develop a train the trainer model of staff development. The T3 program consists of five courses and features seminar sessions on network fundamentals, computer-telephony integration, network access, video services and industry resources. More than 400 teachers have participated in T3.

Second, the E-School/HERN Summer Institute, is a collaborative effort between the Hawaii Education and Research Network (HERN), a National Science Foundation Grant, and E-School. The Summer Institute strives to impact the learning community to design, implement and manage sustainable staff development models that are based on collegial networking and student learning. Finally, the Hawaii Technology Literacy Challenge - Internet Training for 21st Century program, coordinated by E-School, aims to have approximately 10,000 out of the 12,000 Hawaii educators Internet literate by June 1998. In a two-tier procedure, training sessions for complex teams, made up of one representative from each school, were first held in all districts on all islands in 1996. Then during the 1997-98 school year, the complex teams in turn trained educators at their respective schools.

- ***E-rate***

In order to be able to apply for E-rate funding, all K-12 public schools must submit a School Improvement Plan (SIP) with School Vision and Mission Statement to their district superintendent. The School Technology Plan is considered part of the school's Educational SIP. The Hawaii Department of Education's Office of Information and Telecommunications Services has helped schools develop technology plans by organizing a Network Planning Seminar and Starter Kit to assist the districts and schools with network planning. In addition, the department's Advanced Technology Research unit included technology planning in the

Internet Literacy Kit, Technology Literacy Challenge Fund, and Technology and Telecommunication for Teachers Program training sessions.

- ***Higher Education***
- ***University of Hawaii (UH)***

In two recent policy documents, the University of Hawaii reaffirmed its dedication to providing distance learning services to Hawaii's citizens. The University Strategic Plan 1997-2007 acknowledged the increased demand for access to post-secondary education in traditionally under-served regions of the state and the University's mission beyond state boundaries. Four goals of the UH strategic plan had particular relevance for distance learning: providing access to quality educational experiences, implementing differentiated campus missions and functioning as a system, continuing to champion diversity and respect for differences, and strengthening the University as the premier resource in Hawaiian, Asian, and Pacific affairs.

In May 1998, the University of Hawaii updated its distance learning policies in *Executive Policy E3.204, Distance Learning Plans, Policies, and Procedures.* In its statement, the University described its commitment to using multiple technologies (telecommunications- assisted instruction supported by interactive television, cable, Internet-based delivery, telephones, fax machines, teleconferencing, and mail service) and off-site instruction for distance learning. The University placed the responsibility for distance learning on every campus of the UH system. To provide additional support for distance learning, the Board of Regents established University of Hawaii Centers in mid-1996 to provide a permanent University of Hawaii presence in a community that otherwise lacks access to UH programs. The center is a site at which qualified students who are unable to travel to a specific UH campus can enroll in courses or credential programs that are offered by one or more of the University's accredited institutions. While the primary purpose of University of Hawaii Centers is instructional, they may also serve as the receive site for various research and/or public service programs. University of Hawaii Centers are neither separately accredited, nor do they offer degrees or certificates. Their program offerings derive accredited status because they are provided by accredited UH campuses. The Office of Information Technology is responsible for coordinating, scheduling, and ensuring the effective use of technologies such as the Hawaii Interactive Television System (HITS) and cable television.

The Hawaii Educational Networking Consortium, a consortium which has been active since 1993 involving the University of Hawaii (UH), the state Department of Education, and the East-West Center, jointly participated in the NSF-supported Hawaii Education and Research Network (HERN) Project. HERN's goal over its three-year project life-span was to deploy a statewide networking infrastructure to support all public education in Hawaii. HERN capitalized on the state's ongoing activities to link schools within the DOE and all campuses in the UH system to each other and with the Internet. HERN's focus was on developing models for collaboration across multiple levels of education, and considered appropriate management strategies, institutional structures, training systems, support systems and end-user interface requirements needed to provide equitable access to a statewide educational community. HERN closed its doors as an NSF-funded project in early 1998.

THE FUNDING SOURCES

■ K-12

The Hawaii Department of Education received $4.7 million in the first round of the Technology Literacy Challenge Fund grants. The funds will support further expansion of E-School, its virtual K-12 school. Partial funding will be used to review software, online resources and emerging technologies by utilizing these in the E-School courses (web-based, on-air, multimedia supported) created and offered in coming semesters.

Hawaii's legislation and program budgets are focused on "entitlements" to schools with complete local discretion regarding the use of the funding. Approximately $4 million per year in state funds are allocated to schools for educational technology.

■ Higher Education

The National Science Foundation (NSF) awarded $718,308 to the University of Hawaii for the first year of the Hawaii Education and Research Network (HERN). Over the project's three-year period, NSF provided over $2.1 million under its Networking Infrastructure for Education Program.

The University of Hawaii developed a gerontology telecourse entitled "Growing Old in a New Age" with a $1.3 million grant from Annenberg/CPB. The high-quality videos created for this project are now being used in an upper division course delivered statewide via Cable TV.

UH is now in its second year of a 30 year $2.1million National Science Foundation demonstration project, working with the Department of Education to research the implementation and use of statewide Internet services to support education at all levels, K-12 and higher education.

TECHNOLOGY

HAWAIIAN is the Hawaii Wide Area Integrated Information Access Network, the state's inter-island digital microwave communications backbone and intra-island synchronous optical network (SONET) system. The HAWAIIAN carries voice, data, and T1-speed digital videoconferencing services. State data services are accessible via toll-free modem calls on each island. HAWAIIAN is managed by the state's Information and Communication Services Division (ICSD) and capacity on the network is made available to governmental agencies including the University of Hawaii and the Department of Education.

The Hawaii Interactive Television System (HITS) provides inter-island video services for the University of Hawaii, the Department of Education, state agencies, and other organizations.

Point-to-point analog microwave carries four full-motion video signals from Oahu to other islands, with local ITFS distribution to University campuses, some schools and hospitals. There is one return full-motion video from three of the neighbor islands (Kauai, Maui, Hawaii) back to Oahu. Five University campuses on four islands are directly connected through HITS for two-way video programming. In addition, HITS is interconnected with the state's other video networks and is therefore accessible from additional campuses and government facilities. The University of Hawaii and the Department of Education cooperatively plan the program schedule for HITS, and the Distance Education and Instructional Technologies (DLIT) department of the Office of Information Technology at the University of Hawaii manages HITS.

The Department of Education offers two databases for schools statewide to organize student information. MacSchool is a student database designed to run on a Macintosh computer, and is used in 240 of the state's elementary, intermediate, and high schools. WinSchool, for use on computers using Windows, is used in nine schools. The databases maintain student information, develop class schedules, and print report cards. Each of these products acts as an independent "front end" to a consolidated student database maintained on the VAX. Schools update the VAX periodically through FTP transfers of MacSchool or WinSchool database extracts.

The University of Hawaii has used ISDN videoconferencing to provide UH students with the opportunity for educational interactions with fellow students and subject matter experts in Australia, Slovania, United Arab Emirates, the Center for Disease Control, and other mainland locations.

■ ***Cable Television***

Oceanic Cablevision, the largest of Hawaii's cable companies, serves most of Oahu and connects schools via Ethernet over a hybrid fiber-coaxial cable system (Ethernet-over-CATV throughout the island of Oahu). Cable companies on all the islands are required to comply through their franchise agreements with state mandates for institutional network infrastructure (I-Net). I-Net includes various fiber optic services, including synchronous fiber optical connections (SONET) between state buildings including schools and UH campuses, over which video and data are transmitted.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Hawaii provides a promising setting for technology and telecommunications to extend learning opportunities. First of all, the state's topography lends itself to exploring the use of technology to provide educational access to the state's geographically dispersed population. Second, administration of both K-12 and public higher education takes place in just two organizations--the Hawaii Department of Education and the University of Hawaii system. Therefore, discussions and decisions for statewide coordination can be made in a more streamlined fashion than what might occur in other states. Third, there actually is a five-year history of collaboration between K-12 and higher education in planning and implementation projects. Given these considerable needs and assets, if Hawaii manages to obtain the dedicated funding to support its educational technology and telecommunications projects, it could easily leapfrog over other states and become a national leader.

IDAHO

ACRONYMS AND NETWORKS

- BSU—Boise State University
- ICTL—Idaho Council on Technology in Learning
- IPTV—Idaho Public Television
- ISBE—Idaho State Board of Education
- ISU—Idaho State University
- ITAC—Idaho Technology Advisory Council
- ITRMC—Information Technology Resource Management Council
- PUC —Public Utility Commission

EXECUTIVE SUMMARY OF THE STATE

Technology planning began in Idaho in 1987 with the plan for the development of a statewide telecommunications system, which has continued to the present day with the appointments of special task forces, the establishment of technology councils, and legislative actions. The Information Technology Resource Management Council (ITRMC) is the state's attempt to implement and facilitate the acquisition and evaluation of the necessary technical information. In June 1998, ITRMC approved an information technology plan for all state agencies, including education.

Another council that is instrumental in motivating technology initiatives in the state is the Idaho Council for Technology in Learning (ICTL). This council is responsible for making recommendations to the State Board of Education on educational technology plans, policies, programs, and activities. In 1996, the ICTL, the State Board of Education, and the Department of Education released the document, *Connections: A Statewide Plan for Technology in Public Schools* to present a framework of technology for the Idaho public school curriculum.

In addition, the Idaho State Board of Education oversees all of K-12 and higher education activities. A subcommittee of the State Board of Education, the Idaho Education and Technology Oversight Committee (IETOC), has been established to define the relationship between the various statewide councils, and to develop a statewide educational plan (K-12). The goal is to achieve a seamless educational system utilizing technology. Another goal of the Board is to have teachers and administrators trained in the use of technology for education.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Technology planning in Idaho began in 1990 when Governor Cecil Andrus commissioned a special task force to formulate a strategic telecommunications plan for the state. This effort resulted in the publication of *Telecomm '92: Connecting Idaho to the Future*. The publication was adopted by the state legislature in 1993 and created the Idaho Technology Advisory Council (ITAC), which was charged with implementing Telecomm '92's recommendations. In 1995, Governor Phil Batt created the Info Tech '96 Council to review and update the recommendations of Telecomm '92. As part of its findings, Info Tech '96 dissolved ITAC and created the Information Technology Resource Management Council (ITRMC). The Idaho legislature enacted the Idaho Technology Initiative of 1994, which allocated $3.4 million in ongoing funds and $7 million in onetime monies to Idaho schools for the procurement of and training in, advanced educational technologies. As part of the 1994 Technology Initiative, the Governor appointed the Idaho Council for Technology in Learning (ICTL) to distribute technology money to school districts through a grant process. Under the direction of ICTL, 111 of Idaho's 112 school districts have created and implemented district-wide technology plans.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Information Technology Resource Management Council (ITRMC)***

The ITRMC was created by legislative action in 1996. The purpose of the 16-member ITRMC is to facilitate a centralized approach to the acquisition and evaluation of necessary technical information so as to effectuate the informed development of a statewide strategic plan to ensure a coordinated approach to the design, procurement, and implementation of information technology and telecommunications systems for state government and the public.

■ ***Idaho State Board of Education (ISBE)***

The ISBE oversees all K-12 and higher education activity in the state. A Statewide Distance Learning Coordinator has the responsibility for overall coordination and advocacy for instructional technology. If there is a disagreement among state universities, the issue is handled through ISBE's Academic Affairs Task Force. In Idaho, institutions have specific roles and missions assigned to them so that duplication of services is avoided. Some content areas-such as law, health, or engineering—are granted statewide to a particular institution. Geographic areas limit other content. One of the major tasks of the State Board, a review of the roles and missions of the educational institutions, was completed in 1998.

■ ***Idaho Council for Technology in Learning (ICTL)***

The Idaho Council for Technology in Learning was created as a result of the Technology Initiative of 1994. Among its responsibilities, the council makes recommendations to the State Board of Education on educational technology plans, policies, programs, and activities; administers and develops standards and criteria for the public school technology grants; collaborates with educational institutions; and recommends to the State Board of Education exemplary programs, practices, or products. The 15-member council consists of the State Superintendent of Public Instruction, four legislators and representatives of various state agencies, and members from public schools and libraries. Six regional technology advisors from public colleges, universities, and vocational technical education also support the council's work.

■ ***Idaho Public Television (IPTV)***

Idaho Public Television is an agency of the state of Idaho, under the Idaho State Board of Education. IPTV's goal is to serve the unfilled information, education, and entertainment needs of the people of Idaho. To this end, IPTV cooperates with schools and higher education institutions in their distance learning activities.

THE DRIVING FORCE

Both the governor and the state legislature have supported Idaho's efforts to prepare all its citizens for the 21st century by appointing task forces and adopting technology plans. The Information Technology Resource Management Council (ITRMC), the result of state legislation, and the Idaho Council on Technology in Learning (ICTL), a governor-appointed body, represent the state's efforts to address key planning and implementation issues for technology and education in Idaho.

THE PLANS

The Idaho Education and Technology Oversight Committee (a subcommittee of the State Board of Education) has been established to define the relationship between the various state councils and to develop a statewide educational plan (K-12) for a seamless educational system utilizing technology.

■ K-12

In 1996, the Idaho Council for Technology in Learning, the Idaho State Board of Education, and the Idaho State Department of Education released the document, *Connections: A Statewide Plan for Technology in Idaho Public Schools.* The plan presents a framework for the integration of technology into the curriculum of Idaho public schools, and stems from the 1994 Technology Initiative enacted by the Idaho Legislature. The plan contains eight goals for the state's public schools. The goals address the issues of integration, compatibility, community and higher education collaboration, technology systems, evaluation, student training, and system support.

The Idaho State Board of Education has established a statewide goal that teachers and administrators be trained in the use of technology for education. By July 1, 1999, the Department of Education will create and implement Basic Educational Technology Standards for Continuing Educators, a system of accreditation standards and accountability, and require reporting on certified personnel demonstrating mastery of the required basic technology standards. Also by July 1999, all Idaho school districts will have in place a plan that ensures that at least 90 percent of the certified personnel will meet the technology standards for the school by the completion of the school year 2000-2001.

After 2001, administrators, through their respective school districts, will be required to provide specific justification for any certified personnel who have not met the technology standards. Each public school must have educational technology competencies as part of the annual professional development plan for all certified personnel employed by the district. The plan will support successful mastery of the required basic technology standards by the completion of the school year 2000-2001. The standards will be modeled after those of the International Society of Technology in Education (ISTE).

Schools throughout Idaho participate in a variety of electronic projects. The state's Rural High School Networks are administered through the State Division of Vocational Education. Sites on the Rural High School Network are supported through 50 percent state funds and 50 percent Economic Development Grants. In addition, there are five to 10 high schools connected by dial-up or dedicated lines to six institutions of higher education: Boise State University, Idaho State University, Lewis and Clark State College, North Idaho College, College of Southern Idaho, and Eastern Idaho Technical College. All of the participating institutions are connected to each other.

■ *E-rate*

Local districts have the responsibility for applying for E-rate funds, and the state has supported them in any way the local district needs. The Idaho State Department of Education has disseminated information concerning the E-rate by means of a statewide tour, a satellite broadcast, information posted on the State Department of Education web site, and quarterly articles in the News and Reports publication put out by the State Department of Education.

■ *Higher Education*

Each university within Idaho is an independent entity, and each has duplication restrictions concerning the operation of distance learning programs. Institutions are assigned a statewide emphasis subject, for which the university can offer programs statewide without restraint. For example, Idaho State University's statewide emphasis is health.

Idaho is a participating member of the Western Governors University. To support that initiative, the Idaho/WGU Center has been established at University Place in Idaho Falls, a multi-institutional governance site. In addition, two pilot sites, University Place and Micron, have been selected. A Governor's Task Force directs Idaho's participation in WGU.

■ *Boise State University (BSU)*

Boise State University oversees a number of distance learning opportunities. BSU offers Business and Criminal Justice courses over Idaho Public Television's Higher Education Network. Through BSU's wireless cable network, Knowledge Network, the university distributes approximately 14 courses per semester to over 200 students in the Boise area. BSU distributes five to seven telecourses per semester, and reaches more than 170 students through IPTV's channel 4 and wireless cable. BSU has also produced and received non-credit teleconferences. In the fall of 1997, BSU's College of Technology began offering a Distance Learning Network, with courses focusing on vocational training.

The Distance Learning Network currently offers 14 college-level courses per semester in the areas of teacher education, electronics technology, and plumbing apprenticeship. Future plans include developing courses for high school credit for students in 10 high schools. BSU provides 15 to 20 Internet-based courses per semester. Its asynchronous computer conferencing system supports a master's degree in Instructional and Performance Technology, which is offered to students nationwide. Finally, BSU houses a radio classroom, in which lectures are received through the university's public radio station, while World Wide Web and print-based materials supplement the instruction.

■ ***The University of Idaho (UI)***

Approximately 100 distance learning courses reach between 400 and 500 students each semester. UI's courses include graduate courses in 12 technical disciplines, and a full degree is possible through distance learning. UI distributes its courses via videotape, two-way compressed video, and Idaho Public Television's microwave network. Although UI does not offer any courses that are entirely online, the World Wide Web supports almost all of its courses. UI is currently exploring desktop videoconferencing and transmission over ISDN in a pilot project that aims to provide more interactivity in video-based courses.

■ ***Idaho State University (ISU)***

Idaho State University operates 20 distance learning interactive television classrooms throughout the state. The classrooms receive approximately 200 credit hours of graduate and undergraduate courses each week. ISU's distance learning efforts are supported by its Instructional Technology Resource Center, which helps faculty members develop Internet curriculum and programs.

Idaho State University (ISU) is involved in a partnership with seven rural communities in Southeast Idaho to provide a video and data network, called the Southeast Idaho Rural Vocational Distance Learning Project. The network is designed to enhance the competitiveness of the Southeast Idaho work force. Since the project is designed for the entire community, high schools were chosen as the location for Distance Learning Classrooms. The ISU School of Applied Technology will deliver tech prep and adult basic education courses to high school students and community members. Postsecondary courses and short term or continuing education courses will also be offered, as well as teacher certification courses from the College of Education

<u>THE FUNDING SOURCES</u>

■ ***K-12***

Idaho's K-12 schools have used state funds to support their technology projects. The state legislature has provided more than $50 million in the past four years for funding for technology in public schools. The Idaho Public Utilities Commission awarded $3.4 million to support public school Internet access. The state's public schools technology grant program, established in 1996, has provided approximately $13 million for public school technology projects. The Idaho Council for Technology in Learning administers the program.

With regard to federal funding for technology initiatives, Idaho received $1.3 million in federal funding for teacher training in technology in the second round of Technology Literacy Challenge Funds. A total of 51 projects received TLCF grants. Schools also received $2 million in grants funded by the federal Goals 2000 program.

Idaho's schools have also received funding from a major private source. The J.A. and Kathryn Albertson Foundation announced in May 1998 an $80 million technology initiative that includes: ❶ more than $28 million in one-time noncompetitive grants to school districts for computer equipment and educational technology for students and teachers; ❷ more than $11 million during the next three years to support teacher training in how to use and apply technology to better teach students; ❸ more than $23 million during the next three years to support innovative and enhanced approaches to teaching with technology; and ❹ more than $18 million to help equip professional technical academies. The Albertson Foundation will distribute the $28 million in one-time noncompetitive grants in cooperation with the Idaho Council for Technology in Learning to schools for the 1998-99 school year. The Foundation will also fund three staff members for the ICTL to help administer the program and provide technical support.

■ ***Higher Education***

The state Public Utility Commission (PUC) awarded $300,000 to the State Board of Education to support the efforts of the Idaho/WGU Center and the goals of the Governor's Task Force. One of the award program's major goals was to provide a system by which Idaho residents may gain access to the Idaho/WGU home page and the WGU course catalog at no cost to the user. Micron Internet Services offered to provide free limited Internet service to support access to information on distance education and WGU.

Idaho State University's Southeast Idaho Rural Vocational Distance Learning Project was made possible by a $990,000 grant from the U.S. Department of Commerce's Economic Development Administration, and $660,000 in matching money from the Idaho State Legislature. An additional grant from U.S. West has provided funding for the ISU College of Education to hire staff to instruct teachers how to teach via distance learning.

The State Board of Education has provided institutions of higher education $1.7 million for alternative, collaborative course delivery, an award that is administered through the Telecommunications Council.

TECHNOLOGY

The University of Idaho connects four residential sites in Coeur D'Alene, Boise, Idaho Falls, and Twin Falls via a compressed video network. The two-way video courses are transmitted over dedicated T-1 lines, which have dial-up capability.

Boise State University relies on various forms of technology to deliver its distance learning courses. BSU has used Idaho Public Television's (IPTV) Higher Education Network, an analog and compressed video network that offers two-way video and audio, since 1995. BSU operates Knowledge Network, consisting of one-way video and two-way audio courses transmitted via wireless cable to continuing education centers and subscriber homes in the Boise area. In addition, BSU obtains telecourses from PBS and broadcasts them on IPTV channel 4 and wireless cable. BSU has also developed a terrestrial network that transmits digital compressed two-way video courses via dedicated or dial-up telephone lines. BSU's College of Technology's Distance Learning Network uses this as its principle technology. Recently, BSU has begun to rely on the Internet for delivery of its courses. For example, a substantial portion of its Master's in Health Policy degree program is available on the Internet. In the fall of 1998, BSU will offer 11 courses via the Internet.

Idaho State University's Southeast Idaho Rural Vocational Distance Learning Project uses VTEL equipment, operating at 30fps on 384kb bandwidth. Sites are connected via a multipoint controller, which allows flexibility in conference connections. All seven sites can participate in a single conference, or individual sites can be connected individually or as groups, in any combination. The system can be controlled at each location via electronic tablet, keyboard, or remote control.

■ ***Idaho Public Television (IPTV)***

IPTV reaches 93 percent of the state's population through its microwave network, which includes five analog transmitters and 37 translators. IPTV's network is one of two statewide microwave networks (the other is the Public Safety Microwave Network). The state and IPTV have been collaborating to create a single digital microwave network, in the 6 GHz frequency range, which would upgrade capacity from two to three T-1 to three DS-3. Of that bandwidth, one DS-3 would be used by Public Safety, one by IPTV, and the third by the state to enhance its data communications services.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

In general, the shape and character of educational telecommunications and technology initiatives develop according to a state's overall stance towards telecommunications. One of the principles that governs Idaho's state telecommunications policy is that public money should not be used to provide services that would compete with public telecommunications companies. The rationale is that paid service to telephone companies enables them to upgrade and improve their existing services and infrastructure, which results in better, more reliable service to all residents in the state. If the state itself were to maintain its own telecommunications infrastructure and networks, such a move would force the telephone companies to depend on a smaller customer base, thus reducing their profitability and decreasing the standards of service offered to state residents. For a rural state such as Idaho, where a sizable proportion of residents face isolation without a suitable telecommunications service, this issue is especially important.

ILLINOIS

ACRONYMS AND NETWORKS

- ICCB—Illinois Community College Board
- IBHE—Illinois Board of Higher Education
- ISBE—Illinois State Board of Education
- Linc-On

EXECUTIVE SUMMARY OF THE STATE

Over the past two years, Illinois has worked to coordinate technology efforts at every level of education. In 1995, the state established a Center for Learning Technology and seven Learning Technology Hubs to ensure that school districts throughout the state had the assistance they needed to continue developing their technology resources. The 1996 K-12 Information Technology Plan has provided a blueprint for school districts, Regional Offices of Education, and Integrated Service Districts to follow. The state's new K-12 network Linc-On will provide educators with much needed access to Internet resources. In postsecondary education planning efforts, the Illinois Board of Higher Education's Technology Task Force has worked to prioritize and clarify policies for distance learning among the state's institutions of higher education. The University of Illinois continues to develop World Wide Web resources for use in its courses.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Several agencies and a number of regional consortia have shared the responsibility for planning Illinois' educational technology and telecommunications initiatives. The state is divided into ten regional consortia consisting of public and private educational institutions, including universities, colleges, and elementary and secondary schools. Libraries, health care facilities, private industries, and state agencies also participate in the consortia. Within K-12 education, a closer relationship has developed between the Illinois State Board of Education and various regional initiatives through the newly created Learning Technology Hubs.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Illinois State Board of Education (ISBE)***

The ISBE established seven Centers for Education Leadership. One of these centers, the Center for Learning Technologies, works at the state level to improve student learning through technology and telecommunication. The center works with the state's Regional Offices of Education and the Intermediate Service Centers to provide to school districts professional development opportunities, Internet workshops, assistance with technology planning, consultation, and technical assistance.

- ***Illinois Board of Higher Education (IBHE)***

The 15-member Illinois Board of Higher Education (IBHE) coordinates the activities of the state's nine public universities, 40 community college districts, 103 independent, not-for-profit institutions, and 20 independent, proprietary institutions. In 1997, the Board of Higher Education established a Higher Education Technology Task Force to assist with planning for state-level technology development initiatives. The task force was asked to provide recommendations to the Illinois Board of Higher Education and the Illinois Community College Board on the development of advanced information and communication technologies for higher education. The task force's recommendations will be considered as the IBHE plans its budget for fiscal year 1999.

- ***Illinois Community College Board (ICCB)***

The ICCB is the state coordinating board for community colleges. Its mission is to administer the Public Community College Act in a manner that maximizes the community colleges ability to serve their communities. The Board consists of eleven members appointed by the Governor and confirmed by the Senate for six year terms. The ICCB Student Advisory Committee selects one student for a one-year term. The ICCB takes the advice of all the constituent groups of the community college system in establishing policies to implement statutes.

THE DRIVING FORCE

Driving educational technology and telecommunications development in Illinois is a need to balance the regional consortia that have played a strong role in the state's past efforts, with the genuine need to coordinate activities at the state level. The creation of the state's K-12 Information Technology Plan, the local Learning Technology Hubs, and Linc-On represent various ways the state has moved to centralize planning while respecting local autonomy.

THE PLANS

- ***Illinois State Board of Education (ISBE)***

In 1996, the ISBE issued its *K-12 Information Technology Plan*. The plan described a blueprint for a comprehensive, statewide, systematic approach to learning technologies in K-12 schools. The plan urged stakeholders to balance state leadership with regional and local decision making, to look beyond the education community and consider other groups of stakeholders, and to ensure that technology and telecommunications are core building blocks in the redesign of the state's educational system. The plan included a series of nine recommendations to be followed up over a four-year period. The recommendations emphasized creating public-private partnerships, providing state leadership and advocacy, building capacity, and ensuring equitable access to electronic resources. The plan is to be updated during 1998.

One of ISBE's most recent and widely popular educational technology initiatives is its Museum in the Classroom project. This innovative project aims to increase the quantity and quality of student and educator access to online resources, experts, and communication avenues accessible to schools throughout the state. The Museum in the Classroom Project provides funds to match schools and museums so that they can develop online, interactive curriculum projects that utilize the unique resources and capabilities of the state's museums.

The project began in the 1995-96 school year, when the program funded ninety-eight classrooms and four museums. During the second year, an additional 100 classrooms were added and the number of museums increased to eight. In the 1997-98 academic year sixty schools were added to the program, as were four museums. The plans for the 1998-99 school year are to add an additional fifty schools and two museums. Competition to participate in the project is keen: in 1997, over 450 schools submitted proposals for the 60 school grants that were available.

Another of ISBE's newer initiatives is Linc-On, a state network that will provide affordable access to Illinois public schools incrementally over the next three years. In his January 1996 State of the State address, the Governor announced his intent to build a statewide T-1 network for use by all schools, by the year 2000. ISBE is charged with administering and implementing Linc-On. Linc-On will provide ports on the state network for each public school building. ISBE will work with Regional Offices of Education, Intermediate Service Centers and the Learning Technology Hubs to provide districts with support in designing a solution which fits local situations. In 1996, Linc-On's first year, most of its funding supported the statewide backbone and the operation and management of the system. The state pays for the high-speed network, which provides ports to school districts at no charge. The school districts are responsible for the line charges to connect to the state network, school-site equipment expenses, local area networks and workstations within the district. Full deployment of the network throughout the state will be accomplished in incremental phases. Schools are required to have filed technology plans with the ISBE in order to use Linc-On. Linc-On supersedes the state's free, 800 number, dial-up access program for educators which had been in operation since 1993.

■ ***E-rate***

Individual schools and school districts in the state shoulder the responsibility for applying for E-rate funds. The ISBE, Learning Technology Hubs, Regional Offices of Education, and Intermediate Service Centers have been sponsoring meetings and video conferences to assist schools and school districts with the application process.

■ ***Higher Education***

■ ***Illinois Board of Higher Education (IBHE)***

Over the past two years, the Board of Higher Education has focused on regulatory and management issues in distance learning. In 1997, the board identified ways to facilitate approval of quality distance learning programs and mechanisms to protect Illinois consumers from disreputable distance learning providers. The board's recent activities include the development of a consumer information system to help Illinois consumers choose wisely among out-of-state programs and serving as a clearinghouse for higher education information. The Board eventually would become the "consumer report" of higher education with links to accrediting bodies, institutions and other agencies.

In November 1997, the Board of Higher Education accepted the report of the Higher Education Technology Task Force, co-chaired by the President of Waubonsee Community College and the vice-president of Academic Affairs at the University of Illinois. The report entitled *The Illinois' Century Network* contained a vision for communications and computing networking to retain and expand Illinois' position as a leader by the turn of the century. The report calls for continued cooperation with the K-12 sector and the state's technology agency, the Department of Central Management Services. The report also proposes that the state of Illinois initiate the Illinois Century Network as a program of network services at sufficient scale to provide its citizens universal access to education and information resources that are affordable.

- ***Illinois Century Network***

The Illinois Century Network will link every higher education institution in Illinois to every high bandwidth network and to elementary and secondary schools, public libraries, hospitals, government agencies, industry, small business and eventually, individual residents.

- ***Illinois Community College Board (ICCB)***

The Illinois community college system is working with other higher education agencies and institutions to create a Statewide Educational Telecommunications Network. The network will serve colleges and universities, elementary and secondary schools, local business and industry, and local government. The ten regional consortia across the state will aid in the planning process.

The Statewide Educational Telecommunications Network implements two-way interactive video systems for higher education. The Network also partners with K-12 schools, businesses and industries. The Network initiated a T-1 standard for all the connected networks. The ICCB received an additional $15 million to complete the connection with the rest of the 10 regional consortia to the statewide network. There are also plans to add more sites to the already 300 existing sites in educational, business and government institutions.

- ***University of Illinois***

UI-OnLine is a University-wide organization that was established in 1997 to provide coordination and support to the three campuses to deliver educational courses and degrees through the Internet. The courses, certificate programs, degree programs, and the public service resources offered under the UI-OnLine are grounded by the academic programs at the three campuses.

UI-OnLine has been focused primarily on master's programs like the Master of Library Science. However, UI-OnLine is not limited to adult education, but is also serving undergraduates and high school students. Programs such as NetMath are aimed at teaching university-level mathematics to high school students throughout the world.

University of Illinois is in the process of developing OnLine degree programs in Education and Pharmacy. In addition, OnLine certificate programs in Health Informatics, Teaching of Mathematics, Nursing, Public Health and Rehabilitation Studies are also in the development phase.

THE FUNDING SOURCES

■ ***K-12***

The 1996 Illinois State Legislature provided $30 million to the Illinois State Board of Education for Learning Technologies in fiscal year 1997. Of those funds, approximately $10.5 million were dedicated to the first year deployment of the Linc-On network to begin bringing affordable Internet access to public school districts. The K-12 Information Technology Plan calls for $11 million per year in subsequent fiscal years to incrementally provide open ports on this high-speed, high-capacity state network for all public school buildings.

The state-sponsored Museum in the Classroom program provides teachers with a $12,000 grant which is applied to computer and networking charges in the first year, and approximately $3,000 for networking charges in the second year. In the third and subsequent years, the school assumes responsibility for the charges required to maintain the program.

In 1995, the Illinois State Board of Education established the Tried and True grant program to support teachers who are experienced technology users. During the fall of 1995, 106 Illinois classrooms were awarded Tried and True grants of up to $25,000 to support connectivity into their buildings. Teachers received a $5,000 grant for participation in online curriculum projects of their choice. All of the schools that received initial grants were supported through an additional $3,000 grant to ensure their full participation in their project during the 1996-1997 school year. During the 1996-97 school year, the 106 classroom teachers were asked to link their projects to the Illinois Academic Standards. Specifically, they were asked to assist the state in prototyping and benchmarking new designs for teaching and learning with technology and telecommunications.

In the first round of the Technology Literacy Challenge Fund Grant program, Illinois awarded approximately $8.75 million to 51 school districts. The school districts were selected through a competitive proposal process. Reviewers evaluated and recommended funding in each of the seven Learning Technology Hubs. The state was recommended to receive $17.9 million in TCLF funds in the program's second round.

The state's Star Schools program, the United Star Distance Learning Consortium, received funding of $10 million for a five-year period, in a grant administered by Western Illinois University. The United Star Distance Learning Consortium is a non-profit organization consisting of the Illinois State Board of Education, the North Carolina Office of Public Instruction, the Florida Office of Public Instruction, the New Mexico Office of Public Instruction, and

Texas' Region 20–San Antonio. Working in collaboration with the Illinois State Board of Education, this consortium will deliver educational programming to schools within the five member states.

■ ***Higher Education***

A number of higher education technology initiatives appeared on the governor's higher education budget for fiscal year 1998. A total of $5.7 million was provided for computer equipment, instructional technology, and link support at the public universities. For community colleges, $4.9 million in Advanced Technology Grants was allocated to support equipment purchases and assist with technology infrastructure, transmission, and technology costs. The National Center for Supercomputing Applications received $4 million to match a National Science Foundation grant. Libraries in the state benefited from $1.4 million to support the Library Resource Sharing Project.

TECHNOLOGY

■ ***Linc-On***

The Linc-On network is a high-speed data network providing K-12 public schools Internet points of presence in every major LATA in Illinois. In mid-1998, 1,300 to 1,400 schools were connected to Linc-On, and 4,000 schools in the state will be wired for connection by the year 2000. The network is a combination of leased telecommunications lines interconnected by routers and switches into a proprietary statewide network which has multiple DS-3 (45 MB) links to the Internet. Initially the network is designed as a router-based network to support primarily data traffic. The network could be migrated to an ATM (Asynchronous Transfer Mode) system within 24-36 months. Such an upgrade would build on the state's initial investment while adding the integration of video and data.

Linc-On is managed by the Illinois State Board of Education, in cooperation with the Regional Offices of Education, the Intermediate Service Centers, the Learning Technology Hubs, the Illinois Department of Central Management Services, and the Chicago Public Schools. The state of Illinois Department of Central Management Services oversees the Illinois Video Network (IVN), which provides videoconferencing connectivity to 66 sites throughout the state. The network is used for administrative meetings, training, distance learning, and interviews. IVN operates at one-quarter T-1. The Western Illinois Education Consortium and Department of Corrections have sites located on IVN.

■ ***Library Video Network***

The Central Management Services collaborates with the Illinois State Library to add a 16 site statewide Library System network to the Illinois Video Network. The Illinois State Library and the other library systems connect to the network to conduct meetings, staff training, and distance learning on the network.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Imagine a continuum that represents planning for educational telecommunications and technology, whose extremes are "top down" and "bottom up." Three years ago, Illinois' position was firmly at the bottom up end of the continuum. Recently, however, the state's efforts to centralize planning efforts have moved it more towards the center. To date, Illinois has met with some success in encouraging its regional consortia to participate in statewide planning. By establishing regional technology hubs, schools, school districts, and consortia have gained access to key state resources, while maintaining a degree of autonomy from state agencies. Depending on whether this top down-bottom up balance in Illinois continues to work, other states whose planning similarly has been rooted in localities may choose to emulate this approach.

INDIANA

ACRONYMS AND NETWORKS

- CHE—Commission for Higher Education
- DOE—Department of Education
- IHETS—Indiana Higher Education Telecommunication System
- IPSE—Indiana Partnership for Statewide Education Intelenet Commission

EXECUTIVE SUMMARY OF THE STATE

Increased planning for telecommunications and technology is widely apparent in Indiana. The Intelenet Commission has developed the Access Indiana initiatives in conjunction with the state Department of Education, the Indiana Higher Education Telecommunication System, the state library, other state agencies, and the Commission for Higher Education to plan and deploy the state's new digital network. The first stage of the installation was completed in the spring of 1998. With regard to K-12 education, the state's 1996 *Educate Indiana Technology Plan* continues to provide a direction for school technology initiatives. Grant programs administered by the Department of Education support the development of school-level technology plans that adhere to the vision described in the state's plan. In higher education, the Commission for Higher Education has streamlined its approval procedure for new distance education courses and has approved the state's participation in the Western Governors University (WGU). The Indiana Higher Education Telecommunication System has contributed to the design, installation, and operation of the state's telecommunications network, expanded its own distance education course offerings, and is further developing World Wide Web based materials.

RELEVANT BACKGROUND AND BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Many groups have contributed to Indiana's educational technology planning over the past two decades. Within the state Department of Education, as early as 1983 the Indiana Consortium for Computer and High Technology Education began to discuss statewide technology issues as they impact public education. From 1989 to 1993, the Indiana School Technology Enterprise Council assumed leadership for K-12 planning. The State Board of Education's Technology Task Force provided an important push for statewide planning in 1995, action that was carried out subsequently by the Vision Team of the *Educate Indiana Technology Plan.* In developing the *Educate Indiana Technology Plan,* the Vision Team, which represented LEAs, the telecommunications industry, libraries, the business community, teachers, educational service centers, not-for-profit organizations, and state agencies, reviewed prior and current technology-related initiatives, research, reports, and policy issues related to technology. The *Educate Indiana Technology Plan* laid the foundation for the Educational Technology Council, which was established in mid-1997 and now coordinates K-12 initiatives.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Intelenet Commission***

The 16-member Intelenet Commission was established by the Indiana General Assembly in 1986 and is authorized to plan, develop, contract, and manage statewide, integrated telecommunications networks and information technology services that meet the needs of its authorized users. The Intelenet Commission coordinates all life-cycle network and services activities with its public-sector partners under the umbrella of the Access Indiana Program. Intelenet's strategic approach is to use open systems architecture as the foundation of its infrastructure deployment. Intelenet's services are competitively procured through service providers in the private sector. In its unique position, the Intelenet Commission can engage in a cooperative planning process among public-sector customers in urban and rural areas across the state and aggregate the demand for services, thereby achieving economies of scale and other efficiencies. The Intelenet Commission cooperates with the Access Indiana and the state Department of Education in the K-12 Grant Program For Internet Connectivity.

■ ***Access Indiana (AI)***

Access Indiana is a public-private partnership established by the governor in July 1994. Access Indiana was created with the intention of providing a variety of telecommunication services for public sector entities. The goal, so far achieved, was to avoid large investment of state capital and at the same time work toward economic development goals by providing incentives for the private sector to deploy infrastructure. Access Indiana's initial efforts focused on stimulating development of community networks and contracting to provide public access to government databases and information. Over a longer time frame, Access Indiana will develop a statewide infrastructure for use by all public entities in Indiana. One of AI's four major objectives is the connection of schools and libraries to the Internet. This state connectivity program was inaugurated before the federal Universal Service Fund (USF) program was unveiled in the Telecommunications Reform Act of 1996. AI's second major objective is to provide a common, reliable, efficient, and robust electronic government gateway (the Access Indiana Information Network) to state public records, information, and services. The third objective of AI is to establish community networks for local services and community information resources. Finally, AI's fourth objective focuses on the establishment of the state's own common and shared communications backbone, the Access Indiana State Backbone network (AISB).

■ ***K-12***

The Office of Learning, located within the Center for School Improvement and Performance of the Indiana Department of Education, provides leadership and support to Indiana educators in the related areas of instructional technology, media, library, and audiovisual resources.

The mission of the Office of Learning Resources is described as "information empowerment." The office pursues a vision of elementary and secondary education in Indiana, which comprises communities of lifelong learners in resource and technology-rich environments reaching individual and group learning goals. The office strives to promote and implement the Indiana DOE's concept of lifelong learning.

- ***Indiana Higher Education Telecommunication System (IHETS)***

The Indiana Higher Education Telecommunications System (IHETS) and its program services subsidiary, the Indiana Partnership for Statewide Education (IPSE), are vehicles created by Indiana colleges and universities to provide infrastructure and programmatic collaboration in support of their expanding uses of technology on and off campus. The statutory members of IHETS/IPSE are Ball State University, Independent Colleges of Indiana, Indiana State University, Indiana University, Ivy Tech State College, Purdue University, University of Southern Indiana, and Vincennes University. The IHETS Board of Directors and its key committees include representatives from these institutions as well as the Indiana Department of Education and the governor's office.

- ***Indiana Commission for Higher Education (CHE)***

The Commission for Higher Education is a coordinating agency that has worked on behalf of the state's public and independent colleges and universities since its inception in 1971. The commission plans and coordinates Indiana's state-supported system of post-high school education; defines the educational missions of public colleges and universities; reviews both operating budget and capital budget appropriation requests from public institutions. In addition, the commission approves or disapproves for public institutions the establishment of any new branches, campuses, extension centers, colleges or schools; approves or disapproves for public institutions the offering of any additional associate, baccalaureate or graduate degree, or certificate program. The commission is also charged with reviewing all programs of public institutions and making recommendations to the governing board of the institution, the Governor, and the General Assembly concerning the funding and the disposition of these programs. Finally, the commission reviews the budget requests of the State Student Assistance Commission.

THE DRIVING FORCE

Access Indiana's concerted push to develop the statewide digital network has occupied educators at all levels. Public K-12 schools are eagerly anticipating the increased opportunities for Internet connection, the Department of Education is working to coordinate the grant programs that will enable connections, and IHETS is focusing on the building and implementation of the network, and other state agencies. The June 1998 modification in the Universal Service Fund discount program will most likely result in a temporary slow down of K-12 connections, as plans are modified and other sources of funding for access are located.

THE PLANS

■ Access Indiana (AI)

Rapid development of the statewide Access Indiana ATM backbone under the auspices of the Intelenet Commission took place in 1997. Beta testing of the first five nodes occurred during the first half of 1998 and the full implementation took place in the spring of 1998. Another ten nodes are expected to be deployed over the next twelve months. At the outset, the backbone will carry primarily Internet traffic with limited videoconferencing for K-12 schools, public libraries, state agencies, and higher education. Video services should be added by late 1998, and voice services in 1999. Access Indiana also sponsors a community network incubator program (Indiana Digital Counties, or INDICO), which supports networks in thirty, underserved communities throughout the state.

The Access Indiana planning group, representing all of the prospective user constituencies, has provided leadership to the state's schools and libraries in preparing to take advantage of Universal Service Fund discounts, linking the users to the state backbone. Access Indiana is also engaged in advocacy for inclusion of higher education in state discounts, and in building collaboration with rural health interests.

■ K-12

In the spring of 1998, the Indiana Department of Education convened its new Education Technology Council. The 12-member council was created by the General Assembly "to advise the state superintendent and the governor on education-related technology initiatives" for Indiana schools from Kindergarten through Grade 12. Its first activities included a report on the Technology Plan Grant program, the Universal Service Fund, and the Access Indiana Internet backbone. Future topics for the council to consider include the Buddy System project for take-home computers, and the role of the state's Education Service Centers.

In late 1996, the Vision Team for the *Educate Indiana Technology Plan* released its plan, which centered on recommended directions for technology initiatives to enable all learners to access state-of-the-art technologies to improve their learning and achieve their lifelong educational goals. The plan's framework built on four primary goals involving planning, professional development, access, and funding. With regard to planning, the state's goal is to develop school corporation five-year technology plans that support and facilitate each school corporation's overall curriculum, student goals, and assessment of learning, beginning with the school districts in most economic need. The goal for professional development is to provide all educators with opportunities for professional development related to instructional strategies that include using technologies for teaching and learning. The goal for access is to provide equitable access to up-to-date, interactive technologies, including telecommunications technologies, for all educators and learners in schools, libraries, and communities. Finally, the state's funding goal is to adopt policies, develop legislation, and promote alliances for funding to enable planning, equitable and affordable access to technology, and profes-

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sional development statewide and locally. Once a comprehensive school improvement plan for the state is developed, the technology plan will be incorporated into it.

■ *E-rate*

Individual schools and school districts in the state are responsible for applying for E-rate funds. The state Department of Education has sponsored meetings and has posted E-rate updates and background information on its web page.

■ *Indiana Commission for Higher Education*

In April 1994, the Commission for Higher Education (CHE) undertook a pilot project to investigate the feasibility of establishing a virtual university in Indiana. Through a partnership between the Southeastern Indiana College and Continuing Education Coalition (SICCEC) and the Indiana Partnership for Statewide Education (IPSE), residents in southeastern Indiana enrolled in electronically distributed postsecondary courses beginning in the 1994-95 school year. The steadily declining enrollments in IPSE courses over a three-semester period caused the CHE to reconsider further funding for the electronic campus. A 1996 analysis of the electronic campus' limited success pointed to four key factors that still needed to be addressed: the creation of a designated broker, improved marketing, improved academic program development, and improved administrative and student services. Although the commission concluded that a consortium of institutions appeared to be an inefficient mechanism for delivering instruction, in March 1998, CHE announced that Indiana would join the Western Governors University (WGU) in offering courses from Indiana's postsecondary institutions to students world wide. Indiana was the seventeenth state to join WGU's initiative.

In 1998, the CHE introduced a streamlined distance education approval process. The policy guarantees that the Commission will review new Indiana distance education programs within 60 days. The policy also specifies that degree programs must be accessible through one or more forms of electronic technology including the Internet, computer program, CD ROM, video tape, audio tape, television, radio, and/or print correspondence. The CHE used the new approval process in mid-1998 to authorize ten new distance education degree programs, which included three master's, two baccalaureate, and five associate degree programs to be offered by Ball State University, the University of Southern Indiana, and the Terre Haute campus of Ivy Tech State College. For the University of Southern Indiana and Ivy Tech State College, these new programs represent their first foray into distance education.

■ *Higher Education*

Postsecondary institutions in Indiana have been delivering a greater number of courses to off-campus students via technology. Between the fall of 1996 and the fall of 1998, the number of technology-delivered credit courses offered by Indiana's public institutions increased by 75 percent. In the fall of 1998, the major delivery methods are the Internet (41 percent of courses), the IHETS satellite TV network (40 percent), and videotape (17 percent). Enrollments in technology-aided courses have also risen. Although Internet-based courses have experienced the most significant increase in enrollments (by 315 percent), enrollments via cable and public television continue to be the largest group (32 percent of total credit enrollments). At least 24 degree programs (associate, bachelor's, and master's) are available via distance delivery from various colleges and universities, a figure that includes nine courses approved in June 1998 by the Indiana Commission for Higher Education. To extend the reach of postsecondary education to learners at home, IHETS and Indiana Public Broadcasting Stations (IPBS) mounted a pilot program in the spring of 1998 to explore the possibilities of overnight broadcast if credit courses. The overnight scheduling did not prove to be satisfactory, however, and IHETS and IPBS are considering other avenues for cooperation, including early morning or lunch time course telecasts and co-production of special programming for large constituencies.

THE FUNDING SOURCES

■ *K-12*

One of Access Indiana's key initiatives is the K-12 Grant Program For Internet Connectivity, a program co-sponsored by the state's Department of Education and the Intelenet Commission. The K-12 grant program provides school corporations an opportunity to procure a dedicated 56K or T-1 connection to the state network and the Internet. The dedicated 56K or T-1 connections will provide schools with a technology that can later be expanded as their resources permit, such as interactive video services for distance education or administrative communications. The Intelenet Commission manages the disbursement of up to $3 million in annual funds from the Indiana Technology Fund to support the K-12 Internet activity. The Commission orders services and manages network design details with the vendors. Two rounds of Access Indiana Grants totaling $6 million have been made available to school corporations for establishing dedicated connections to the state network and the Internet. Portions of the K-12 grant program also provide dollars that may be used for necessary local infrastructure within the schools and training programs for faculty and staff.

In June 1998, the Office of Learning Resources awarded thirty-five grants ranging from $1,585 to $5,000 - more than $150,000 total—to educators across Indiana for the use of telecommunications in middle school grades for reading and literature instructional activities to take place during the 1998-1999 school year.

The Office of Learning Resources awarded grants totaling $140,000 in June 1997 to sixty individual agricultural business, agricultural science, and marketing education teachers across Indiana. The purpose of the grants was to provide financial assistance to the teachers in implementing the use of computer-based telecommunications for instructional purposes in their classrooms during the 1997-1998 school year. Funding from the initiative could be used for the acquisition of appropriate computer hardware and software; installation and maintenance of requisite telecommunications lines into the classrooms; and payment of subscription or participation fees for specific programs and purchase of classroom supplies or materials directly related to participation in grant funded programs. The amounts of the individual grants ranged from $1500 to $2500.

Previous distance education grant initiatives include $284,000 awarded to 125 Indiana teachers for instructional use of computer-based telecommunications in the elementary classrooms during the 1996-1997 school year; $272,000 awarded to 125 Indiana teachers for instructional use of computer-based telecommunications in elementary classrooms during the 1995-1996 school year, and $100,000 awarded during the 1993-1994 school year to forty-five Indiana high schools in thirty-five districts to assist them in offering their qualified students selected advanced placement mathematics and science courses via distance education.

The state's General Assembly established the six-year Technology Plan Grant Program in 1995 to provide funding from the Indiana Technology Fund for implementation of school districts' five-year technology plans. School districts received planning grant funds beginning with the district having the lowest assessed valuation for property tax purposes per student in average daily membership (AAV/ADM). Technology awareness grants totaling $25 million were awarded during the 1996-97 school year to assist an initial 51 districts in developing their technology plans. The Indiana legislature appropriated $30 million dollars for the 1997-1999 biennium. During the 1997-98 school year, an additional 33 school districts received technology planning grants, while 87 school districts will obtain funding during the 1998-99 school year.

Indiana received $3 million in the first round of the federal Technology Literacy Challenge Fund in 1997-98 to support its High School Tech project. With an additional $6 million awarded in 1998-99, the High School Tech project will increase from 15 to 30 schools. Indiana's High School Tech project targets developing systematic plans to integrate technology into the high school curriculum, in accordance with the vision described in the *Educate Indiana Technology Plan.*

A settlement reached between the Indiana Utility Regulatory Commission and Ameritech created the *Opportunity Indiana* regulatory reform plan. With *Opportunity Indiana*, Ameritech will invest up to $120 million through the year 2000 to extend an advanced communications network to every interested school, hospital, and major government center in its Indiana service area. This network, which includes broadband voice, data, and interactive video applications, could link a potential 1700 Indiana schools, 500 major government center locations, and 100 hospitals. In addition, Ameritech has contributed $30 million to establish the Corporation for Educational Communications (CEC), which provides project planning, implementation, and grant administration for educational technology programs in Indiana. The CEC's Two-Way, Interactive Video Distance Learning K-12 Curriculum Development Grants are meant to foster innovative projects that help dissolve the constraints of distance between learners in schools and their communities and blur traditional boundaries of curricular disciplines. CEC also sponsors three types of grants ranging from $1,000 to $5,000 that support curriculum development and professional development opportunities for teachers. Teachers who work in Ameritech's Vision Athena schools are eligible for the grants.

- ***Indiana Higher Education Telecommunication System (IHETS)***

IHETS is funded by the state of Indiana for infrastructure operation, administration, and utilization ($6.3 million in 1997-98 for both capital and operating expenses, and including a new item for course-development grants). The college and universities absorb production and reception costs within their operating budgets and pay a modest share of network costs.

TECHNOLOGY

- ***Access Indiana's Public Transport Network***

The Intelenet Commission is working with IHETS, the Department of Education, the State Library, and the State Department of Administration on the design and initial deployment of the shared backbone architecture. Initial deployment began in February 1998 with the installation of ATM switching equipment at major nodes in Fort Wayne, Muncie, Indianapolis, Terre Haute, and Evansville, which were interconnected with very high speed (DS-3) connections. Four more nodes were installed in August 1998, in Gary, South Bend, Columbus, and New Albany. The remaining nodes (most likely in Kokomo, Lafayette, Bloomington, Vincennes, Westville, and Richmond) will be completed by June 1999. Local carriers provide circuits to connect sites to these backbone nodes.

- ***Indiana Higher Education Telecommunication System (IHETS)***

The IHETS consortium operates statewide video, voice, and data networks. The television network, an eight-channel satellite network using digital compression, moved to GE3 at the end of 1997. Fifteen network uplink channels are located at college and university campuses in seven cities throughout the state. Additional Indiana Universities (IU) regional campuses can transmit via the IU campus network to reach an IHETS uplink, and there are links with schools in Ameritech's Vision Athena Project. IHETS Television counts over 325 direct receiving locations, more than one-third of which is K-12 schools. Other sites include hospitals, businesses, county extension offices, public TV stations, public libraries, and state facilities, as well as college and university campuses; approximately 10 percent of the receiving sites are located throughout the United States. One of the satellite channels is designated for program delivery to cable and wireless cable systems, and public TV stations throughout the state, providing in-home instruction from all the colleges. Although the IHETS satellite system is used primarily for college credit and non-credit programs, the network also carries nine high school and AP courses, an elementary school foreign language series, and monthly electronic field trips for K-12 schools.

IHETS' voice network links all college and university campuses, carrying some 19 million minutes of traffic each year. The associated audio conferencing service includes a 29-port bridge heavily used for administrative meetings and occasionally for non-credit conferences. In 1996 IHETS added a videoconferencing service for ISDN users, which has been used for both credit courses and administration.

IHETS' data network, INDnet, has successfully moved to the state's ATM backbone, and IHETS is experimenting with SUVON service via the backbone as well. INDnet provides primary Internet access for most colleges and universities, as well as some libraries, schools, and state agencies. In part because of IHETS' experience with network management, Access Indiana has contracted with IHETS for initial management services for the ATM backbone. INDnet will constitute the core of the first set of services on the state's network.

The state's public institutions of higher education are making strides to interconnect. Ivy Tech State College will connect its 23 centers over the next year for videoconferencing and Internet communication. The Southeast Indiana Cooperative will have most of its Learning Centers connected for video by the spring of 1999. Indiana University operates a multi-way video network among its nine campuses, using T-1 compression. Used for administrative meetings and faculty development seminars as well as credit courses, the network has seen rapid increases in utilization since its first year of operation in 1995-96.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Indiana's situation reflects the critical role planning and cooperation play in today's telecommunications technology environment. Similar to other states, in two short years Indiana has moved from being a state without a central plan for K-12 technology to having a well-conceived statewide plan in place. Unlike a number of other states, however, Indiana has made the decision to contribute further to coordinated planning by providing a series of grants that encourage schools and school corporations to develop their own integrated plans for technology. Although the Department of Education appears to be favoring Internet-based applications over other, more accessible technologies, it has taken an important step that other states have yet to do: allocate resources for technology. No matter how thorough a statewide plan is, no matter how worthy its vision and goals, unless the state extends to schools financial support for technology planning it is unlikely that a critical mass of change will result. Certainly, Indiana will have to focus just as much as other states to reassess financing Internet connectivity to schools in the wake of the cuts in the Universal Service Fund discount program. But with the Department of Education's involvement with the Intelenet Commission, Access Indiana, and IHETS, schools in Indiana have at least a few other resources to turn to that schools in states without such collaborative activity lack.

IOWA

ACRONYMS AND NETWORKS

- AEA—Area Education Agencies (regional)
- ETC—Educational Telecommunications Council
- ICCPHSE—Iowa Coordinating Council for Post High School Education
- ICN—Iowa Communications Network
- IDE—Iowa Department of Education
- IPTV—Iowa Public Television
- ITTC—Iowa Telecommunications and Technology Commission, governing board for ICN
- RTC—Regional Telecommunications Council
- SILO—State of Iowa Libraries On-line (information access network)

EXECUTIVE SUMMARY OF THE STATE

The Iowa Communications Network (ICN), the only fully integrated, end-to-end state owned and operated network, continues to grow in the number of sites as well as the amount of use. Part III of the implementation plan, which will establish connections to the all school districts, is scheduled for completion by June 1999. Although debate raged several years ago about selling the network, it remains under state auspices. Current discussions focus on management of the network, especially on the topic of outsourcing management.

The ICN has brought technology to the schools for distance learning and Internet access. ICN also serves state and federal government, hospitals and physicians, and public libraries. In addition, Iowa Public Television (IPTV) and the Iowa Department of Education provide further support for schools' use of the ICN's resources. Institutions of higher education also continue their use of the network for distance education activities.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Construction of the statewide, state owned Iowa Communications Network began in 1991, the result of a two-year planning process by IPTV and the Department of General Services. At that time, the legislature had mandated that a plan for a statewide educational telecommunications network be developed by January 1989. Parts I and II of the fiber optic network project were completed in 1995, and connected each of the 99 counties, the three state universities, IPTV, and the Capitol Complex on the fiber optic backbone. The 1994 legislative session created a governing structure and parameters for the implementation of Part III, including the Iowa Telecommunications Technology Commission, the Educational Telecommunications Council, and the Regional Telecommunications Councils. Part III is a four-year project that aims to connect all public and private school districts, public libraries, and Area Education Agencies (AEAs) throughout the state.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Iowa Communications Network (ICN)***

A six-member Iowa Telecommunications and Technology Commission (ITTC) governs the Iowa Communications Network (ICN). In 1996, the duties of the Department of General Services Communication Division were transferred to the ICN, including the operation of the WAN serving state agencies and communications services in the Capitol Complex and Des Moines area. The ICN currently provides data, long distance voice and full motion video service to users authorized under a 1994 legislative bill that outlined governing structure and parameters. Authorized users include higher education institutions, K-12 schools, public libraries, state government agencies, hospitals, the National Guard, and the federal government.

As the governing body, the ITTC sets policy and makes legislative requests for the network. The issue of privatizing the ICN management is under consideration by a legislative subcommittee. Even if the state legislature opts to pursue privatization, it will not be considered in depth until the year 2002, after Part III of the network is completed.

■ ***Board of Regents (BOR)***

The Board of Regents governs the three, four-year regents universities. Each of these universities observes a statewide mission. The University of Iowa concentrates its activities on professional degrees, liberal arts, and the humanities. Iowa State is a land grant institution, providing extension services and emphasizing science and technology in its programs. University of Northern Iowa centers on the educational field and teaching. In October 1997, the Board of Regents adopted a revised distance education policy. As part of the policy, the Board of Regents asked for institutional cooperation in providing distance learning programs and courses. Although only one joint degree was offered in January 1998, several others were in the planning stages.

■ ***Community Colleges***

The community colleges are responsible to the state board of education and to a locally elected board. The colleges' coordinate their distance learning activities in conjunction with the Iowa Coordinating Council for Post High School Education (ICCPHSE).

■ ***The Iowa Coordinating Council for Post High School Education (ICCPHSE)***

ICCPHSE is a voluntary organization that brings together all sectors of postsecondary education, both public and private, to discuss common issues. The Board of Regents provides the staff time for the Council.

■ *Iowa Department of Education (IDE)*

An overarching goal for the Iowa Department of Education (IDE) regarding educational technology centers on helping technology become a component of overall school improvement. The IDE actively addresses local standards, reexamines teaching and learning to make it more effective, and builds community based partnerships. As education in Iowa is primarily locally controlled, the 15 Area Education Agencies (AEAs) assume a direct educational role. The IDE supports the AEAs and the local school districts without interfering in local initiatives and identities.

■ *Educational Telecommunications Council (ETC) and Regional Telecommunications Council (RTC)*

The Educational Telecommunications Council (ETC), an advisory council to the ITTC, establishes policies relating to educational use of the ICN. The ETC also coordinates activities of the 15 Regional Telecommunications Councils (RTCs), which deal with regional and local issues relating to the network. The ETC recommends long range plans for enhancements to the network for educational applications.

Although the Regional Telecommunications Councils originally offered technical support to the various sites on the ICN, they now concentrate on programmatic issues. Each RTC includes a combination of users and providers, which allows a swift evaluation of needs and resources. Iowa Public Television and the Iowa Department of Education do not provide centralized professional development and training. Instead, the RTCs and AEAs oversee the regional training and professional development efforts.

■ *Iowa Public Television (IPTV)*

Iowa Public Television (IPTV) provides statewide coverage through its eight transmitters and eight translators. IPTV has traditionally coordinated educational telecommunications in the state. Through an informal alliance with the Iowa Department of Education, IPTV oversees program sharing and facilities, and removes barriers to educational technology. IPTV's previous role with the ICN had focused on design and standards, and on the delivery of technical support. IPTV currently centers its efforts on content utilization of the network. IPTV works to bring educational resources to teachers through the development of the Iowa Database, a World Wide Web based resource for educators.

■ *Iowa Distance Education Alliance (IDEA)*

IDEA organized in 1991 to write a collaborative federal Star Schools grant, which subsequently received funding. Each year, IDEA writes an evaluative report on federal grant programs for distance learning. One of the organization's recent reports focused on the ICN and its effectiveness, and offered recommendations for its operational improvement.

THE DRIVING FORCE

The commitment to a centralized telecommunications infrastructure shapes the decision making within and among the individual schools, school districts, institutions, agencies, and other organizations in the state.

THE PLANS

■ *Iowa Communications Network (ICN)*

July 1998 marks the beginning of the final year of the four-year Part III implementation plan. This phase of the implementation will connect 377 school districts and 50 libraries directly to the ICN with a dedicated DS-3 line. Most of the districts will be connected at a high school. School districts assume responsibility for last mile connections from the district connection point to the school buildings. The DS-3 bandwidth is sectioned to use 39 Mb for full motion video, and four T-1s for data and other administrative connections, allowing voice, video and data to be transmitted over a single line. As the original Part III contract did not specify the technology to be used for the full motion video, some analog circuits have been installed. The legislature in 1997 approved a request to upgrade all analog sites to digital formats in order to make use of combined voice, data, and video capacities.

Part III of the plan involves only educational connections to the network. The National Guard, federal government, hospitals, and state government all expect to increase the number of sites connected on the ICN. Because legislative rulings in 1994 delineated the authorized users of the network, it is unlikely that the user base will expand in the future. Currently under consideration by the state legislature is a plan to convert the ICN to an ATM technology, a $17 million proposal. A related topic is using the MPEG2 standard for video on the network.

■ *Board of Regents Distance Education Policy*

After one year of work, the Board of Regents adopted a revised distance education policy in October 1997. The policy states that distance education courses and programs should be of the same quality that each institution normally offers, without distinction by virtue of the medium, and should follow the institutional mission and meet the needs of the students. The policy also urges cooperation among regents and non-regents institutions for distance learning. New degree programs and follow up evaluations, as well as yearly statistics about the distance learning programs, must be reported to the Board of Regents. Under the policy, institutions must not make distinctions between distance learning and traditional programs, which has implications for the delivery of library resources, student services, admissions requirements, and faculty requirements.

The Board of Regents revised its enterprise-wide Strategic Plan for the development of higher education in January 1998, and in this plan retained broad statements pertaining to distance learning. As part of this document and the revised distance education policy, the presidents of each of the state institutions have been charged with composing an institutional strategic plan for distance education, which will include a section on collaboration with other colleges and universities. In addition to each of the institutional plans, the committee on distance learning is also devising an inter-institutional plan.

■ ***School Improvement Technology Act (SITA)***

Now in the third of a five year $150 million provision, the *School Improvement Technology Act* aims to bring integrated technology into the schools. Individual school districts may decide how to use the money, and expenditures may include infrastructure, end user hardware, and faculty development. Each school must have an integrated technology plan as a prerequisite for receiving the funds. The Iowa Department of Education is working with the Area Education Agencies (AEAs) in developing the framework and integration strategies for technology plans.

■ ***E-rate***

The Department of Education assists Iowa schools with their E-rate applications by providing information and support, as well as facilitation of group applications. The E-rate funds will assume a large role in connecting more schools to the ICN with both Internet and interactive video classrooms, as each district will have a connection point to the ICN by 1999 under Phase III of the ICN implementation plan. The AEAs have been given the authority to approve technology plans for consideration for federal E-rate funds.

■ ***Iowa Public Television (IPTV)***

IPTV focuses its distance learning work on two programs: virtual field trips and a school-to-work program. The school-to-work program, now in its pilot phase, brings businesses and schools together to promote knowledge of the types of skills needed to compete in certain fields. The ICN offers a way to bridge this gap by providing accessibility to the schools and business leaders.

THE FUNDING SOURCES

■ ***K-12***

The *School Improvement Technology Act* is a five year, $150 million effort in public K-12 education, which distributes $30 million per year. The Technology Literacy Challenge Funds brought $1.4 million to Iowa in the program's first year, and $2.5 million in the second.

■ ***Iowa Communications Network***

The ICN is subsidized by the state general fund at $3.135 million for fiscal year 1998. An additional $1 million was requested for 1998. Parts I and II of the ICN implementation were serviced at $180 million and these monies established the state owned and operated backbone and equipment infrastructure. Part III will cost $97.4 million, and as the connections from the backbone to the districts are leased, includes a seven-year lease for each drop from the date of installation.

TECHNOLOGY

■ *Iowa Communications Network (ICN)*

The Iowa Communications Network was designed to serve the educational community with full motion, interactive video. Over 537 interactive classrooms are connected to the ICN as of January 1998, with 279 sites at K-12 schools, 86 at community colleges, 24 at Regents universities, and 16 at Area Education Agencies. An average session connects five sites, though more than 300 sites can be involved in a single interactive session through the central and 15 merged area hubs. More than 700 interactive sessions take place per day. Rates for use of full motion video for K-12 is $5.25 per hour and for higher education $6.30 per hour.

In 1995, the ICN established EDNET to provide Internet and data service over frame relay circuitry through a DS-3 connection to the Internet Backbone. Schools use dedicated lines ranging from 56Kbps to T-1 through the schools' district access point to the ICN. DS-3 to DS-1 compressed video is also possible through the use of codecs at the central switching station. The network also offers dial-up T-1 compressed video, especially for telemedicine and corrections applications. In the future the network could use ATM technology.

■ *Board of Regents (BOR)*

As the geographic distribution of the regents institutions brings them into close proximity with each other in the eastern section of the state, they cooperatively operate a resource center in the western part of Iowa. The resource center offers master's and baccalaureate degrees through distance learning technologies. Additionally, two Graduate Studies Centers operate in Sioux City and the Rock Island areas. Operated by independent groups, these centers broker courses on an interstate level, fitting needs of the students with course offerings and matching requirements of the different institutions.

■ *Higher Education*

There are currently five ICN classrooms on the University of Northern Iowa campus. Delivery and origination of video is possible at almost any classroom on campus through the campus video system. Iowa State has 11 ICN classrooms, and the University of Iowa has eight.

■ *University of Northern Iowa*

At the University of Northern Iowa in 1997, approximately 645 students participated in 20 courses per semester via the ICN. In addition, approximately 40 students in 1997 enrolled in 2 to 3 World Wide Web based courses per semester. These statistics do not reflect all distance-mediated instruction, as a great deal of instruction takes place through departments' independent efforts.

Most on site courses are graduate degree programs in education. UNI actively pursues Internet delivery using the module development model promoted by the Western Governors University. Under this model, courses are not measured in terms of credits, but in descriptive terms of time on task, skills gained, and time for delivery. UNI is working with 72 of the 600 faculty members through mini-grants to develop distance learning courses and courseware for the Internet and the ICN.

At UNI a Real Video server and other open standards video conferencing for the LAN can be transmitted over the ICN data network, as well as provided through dial-up capabilities. H.323 is for Internet conferencing; video streaming capabilities is used over Real Networks. These services are integrated with the traditional ICN video conferencing capabilities, yet provide service on demand or asynchronously as needed.

- ***Iowa State University***

In the past year, Iowa State University has offered 175 courses via distance learning. Approximately 3000 students participated in the distance learning program. The courses that have been provided were all graduate programs. Iowa State University offers master's degrees via distance learning in engineering, leadership and education, agriculture, agronomy, management and public policy, and animal science.

Distance learning through Iowa State University is primarily through ICN, videotape and the World Wide Web. 135 courses were offered through ICN, 22 via World Wide Web, and 18 through video tape. Iowa State University does have a plan to expand its program. The plan includes a stronger program via the World Wide Web to expand to the national and international arena.

- ***University of Iowa***

In the last six months of 1997, the University of Iowa offered over 4800 K-12 sessions and nearly 6,000 sessions for higher education over the ICN.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Iowa's situation illustrates the strengths and weaknesses involved in a centrally located infrastructure and planning organization for telecommunications. For better and for worse, the ICN is a critical component of every distance learning activity in the state. This means that education's particular needs are intertwined with the telecommunications and technology needs of other state agencies and institutions, with inevitable discrepancies involving services, rates, and scheduling. Still, unlike many other states, Iowa benefits from having clearly articulated policies for usage and cooperation, which have contributed to the diverse distance learning initiatives over the past few years. Although it is unlikely that any other state will follow the road Iowa chose—building and operating its own network—the state's current discussions concerning outsourcing network management and subsidies from state governments may still impact similar debates in other legislatures.

KANSAS

ACRONYMS AND NETWORKS

- DISC—Division of Information Systems and Communications
- ITAB—Information Technology Advisory Board
- ITEC—Information Technology Executive Council
- KANREN—Kansas Research and Education Network
- KBOR—Kansas Board of Regents

EXECUTIVE SUMMARY OF THE STATE

Kansas has stepped up its efforts to coordinate the state's technology planning process with the passing in 1998 of Senate Bill No. 5, which calls for restructuring of statewide Information Technology infrastructure and the effective management of Information Technology capital and resources. The bill establishes The Information Technology Executive Council (ITEC), and it creates positions for three Chief Technology Officers (CTO) within the executive, legislative, and judicial branches of state government. The council recently produced a *Strategic Information Management Plan* for the state government, which identified goals and objectives for the state's direction, as well as numerous recommendations concerning new roles and responsibilities for ITEC and CTOs.

The ITEC was not alone in its planning efforts. The State Department of Education produced its own *Kansas Educational Technology Plan*, which framed technology use in schools as a valuable part of school reform. In higher education, the State Board of Regents adopted a new policy on distance education in 1995 that permits institutions to deliver distance education courses anywhere in the state. The Board of Regents also issued a paper that encouraged further investment of resources in developing asynchronous, Internet-based courses. The state's community colleges are also targeting the development of a statewide plan for distance education, which many community colleges now pursue on their own.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The Kansas State Department of Education has been increasingly concerned with developing a cohesive technology plan for all schools. In 1995, the Kansas Technology Facilitation Team was established to initiate direction for the State Department of Education and legislators. The team's survey of Kansas educators revealed the disheartening news that teachers needed professional development to help them acquire technological skills; that the majority of the computers in Kansas classrooms were obsolete or had limited capability; and that classrooms needed to be wired and equipped. This information, in conjunction with the national call for school reform through technology, provided the incentive for the Department of Education to undertake a study of technology issues facing the state in the fall of 1996, with the goal of developing a vision for educational technology in Kansas.

Institutions of higher education in Kansas have witnessed an increase in their technological capabilities. In 1996, TELNET, the audio-only network operated by the Kansas Regents Network, migrated to a desktop video, ISDN network. With financial support in the form of a $200,000 Bureau of Justice grant and a $40,000 Rural Utility Services grant, TELNET2 connects sites at the Regents institutions, 13 community colleges, one educational service center, and five school districts.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Information Technology Executive Council (ITEC)***

ITEC was created by legislative action in 1998 to provide general management oversight and coordination of information technology policies, programs, and resources for state government. The three Chief Information Technology Officers report to the 20-member council and serve the council to develop policies and standards, promote coordination of programs, establish and maintain a management plan, and otherwise assist the council in its oversight of projects and resources. Both ITEC and the CITOs are located in the Department of Administration. ITEC's membership includes the heads of the major agencies in the executive branch, a member of the House and a member of the Senate, the Judicial Administrator of the Kansas Supreme Court, a member of the Kansas Corporation Commission, the Executive Director of the Board of Regents, the Commissioner of the Department of Education, executives from three major private firms, the Budget Director, and Chief Information Technology Officers.

■ ***Information Technology Advisory Board (ITAB)***

The senior information technology managers from each of the ITEC's organizations comprise the Information Technology Advisory Board (ITAB). ITAB's purpose is to organize the information technology community for coordination and consensus; to obtain the additional resources needed to develop policies, standards, statewide programs, statewide contracts, and to address other resource management issues. The Board is chaired by the assigned Chief Information Technology Officer, who provides a link between the general management level and the operating information technology organizations in state government.

■ ***Division of Information Systems and Communications (DISC)***

The Department of Administration's Division of Information Systems and Communications (DISC) is responsible for the planning and implementation of the statewide network infrastructure. DISC recommends planning directions to the ITEC.

■ ***Kansas Board of Regents***

The nine-member Board of Regents oversees six institutions in the state: the University of Kansas, including the Medical Center in Kansas City; Kansas State University, including the Salina campus; Wichita State University; Emporia State University; Pittsburg State University; and Fort Hays State University.

■ ***Kansas Department of Education***

The Kansas Department of Education oversees K-12 schools in the state, the state's 19 community colleges, and 21 area vocational schools.

THE DRIVING FORCE

Signals for greater coordination and cooperation to streamline the state's technology and telecommunications planning process can be detected throughout agencies and institutions in Kansas. This movement is especially apparent within the state government. Educational technology and telecommunications initiatives in Kansas are beginning to feel the impact of the establishment of key policy-making entities, a legislative push for greater coordination of distance education efforts in higher education, and the implementation of a coordinated plan for K-12 technology.

THE PLANS

■ ***Information Technology Executive Council***

One of ITEC's first responsibilities was the development and adoption of a *Strategic Information Management Plan* for the state government, a project that the state's CITO managed. The plan described obstacles to the coordinated use of information technology in state government, and listed 24 goals, 63 objectives, numerous recommended programs, processes, and policies, and new roles and responsibilities for ITEC and CITOs. The plan also identified steps for implementation of the proposals.

■ ***K-12***

In 1997, the Kansas Department of Education disseminated the *Kansas Educational Technology Plan*, which included a vision for technology and three goals based on ❶ the vision for reform that guided state efforts throughout the 1990s, ❷ research findings, ❸ analysis of current state reform goals and activities, ❹ inventories of technology resources, ❺ analysis of needs, and ❻ projections of costs. The Kansas vision for educational excellence includes the use of technology to support new models of teaching and learning that enable all students to meet challenging standards, to utilize technology at an appropriate level, and to be able to adjust and adapt to new technologies as they are developed. To reach this vision, the plan identified three goals. First, that each student will demonstrate knowledge and application of appropriate technology. The plan's second goal is for every educator to have the training and support necessary to infuse technology into the teaching process in order to enhance student learning. The plan's third goal is for all teachers and students to have access to current technology in their classroom. The plan articulated the agencies and organizations responsible, the activities involved, and the timeline necessary to meet the goals.

■ ***E-rate***

The Kansas Department of Education provides training to assist schools in developing technology plans and in completing E-rate applications. Each school is responsible for submitting its own applications.

■ ***Higher Education***

On Sept 18, 1997, after working with a year-long task force on the subject, the Kansas Board of Regents adopted a new policy on distance education. An informal moratorium previously had been placed on geographic service areas with respect to distance learning programs for the six regents institutions. The new policy codified this, now declaring that any mediated distance education course can be delivered anywhere throughout the state. A distance education course is defined as one in which two-thirds of the course is delivered via electronic means. Additionally, any degree program, to qualify as a distance learning program and therefore be made available statewide, must have at least two-thirds of the requirements met through distance education courses as defined above.

The Council of Chief Academic Officers issued a paper in May 1997, which was subsequently adopted as BOR policy, stating that while mixed media and other interactive courses should continue to be used in distance education, future investment of resources should be targeted toward the development of asynchronous, Internet-based courses. Investments in infrastructure should also be concentrated at the campus level, rather than in statewide connectivity.

The Board of Regents reported that the total number of mediated distance education courses delivered between the fall of 1994 and the fall of 1996 increased by 37 percent, while the total enrollment in mediated distance education courses increased by 32 percent. The Kansas University Medical Center showed the most dramatic percentage increase in mediated distance education courses, enrollment, and student credit hours during this period.

The Regents Educational Communications Center (RECC), a teleproduction facility at Kansas State University, offers fixed and mobile satellite uplinks with downlink sites to 125 locations in Kansas. RECC also relies on audio-tapes, videotapes, computer conferencing, TELNET2, and online resources to distribute instructional material to students.

■ ***Community Colleges***

The 19 community colleges in Kansas are locally governed, and each operates within a designated geographic service area. The community colleges can not offer services in counties where there is a regional state university without express permission of that institution. Approximately one-third of the community colleges has some form of distance learning program, typically an interactive television network. Community colleges' distance learning efforts within and outside the state's borders face two obstacles. First, the restrictions on their service areas also apply to distance learning. Second, a 1989 attorney general's ruling prohibits the offering of courses outside of the state. A new commissioner for Kansas Community Colleges has established a task force to start a statewide plan for distance learning among the community colleges. The task force was expected to make recommendations on how to tackle some of the obstacles to the growth of distance learning by July 1998.

THE FUNDING SOURCES

K-12

Kansas devoted $75,000 of its $846,000 Year 1 Goals 2000 award to develop its state educational technology plan. In addition, a number of subgrants for its $3.1 million award in Year 2 of the Goals 2000 initiative focused on the use of technology in school reform.

In 1998, Kansas designated $3 million for its Technology Literacy Challenge Fund (TLCF). The state legislature also appropriated $10 million for state technology for K-12. An additional $1 million was received through the state Excellence Grant.

Higher Education

The State Department of Education advocated for $3 million to be used for instructional equipment for area technical schools and colleges, while the governor's recommendation for 1997-98 was $2 million. Additionally, $1 million was appropriated by the 1997 Kansas Legislature for technology for community colleges and one urban university.

TECHNOLOGY

Information Network of Kansas (INK)

INK is a statewide network that provides access to public information within agencies via a dial-in gateway. INK was established through legislative action in 1990. The Kansas Information Consortium manages the network, and a 10 member board appointed by the governor administers INK's policies.

Kansas Research and Education Network (KANREN)

KANREN is a non-profit consortium of colleges, universities, school districts and other organizations in Kansas, organized for the purpose of facilitating communication among them. KANREN operates a state-wide TCP/IP network of dedicated frame relay connections, 56k to multiple T-1, on behalf of its member institutions, but is not a commercial Internet Service Provider (ISP). There are six T-1 connections between the KANREN backbone and the Internet.

TELENET2

In 1996, the Kansas Regents Network's TELNET audioconferencing system developed into TELENET2, a videoconferencing network with classrooms at 28 locations throughout the state, including three, four-year universities, which originate the programming. Desktop video conferencing is run over the network at 128Kbps on leased ISDN lines from Southwestern Bell Corporation. TELENET2 is funded through state appropriations, fees collected from participating institutions, and outside usage fees. The network serves approximately 13 to 14 credit courses per semester, and reaches approximately 420 students.

■ ***KANS-A-N***

KANS-A-N is the state government's digital telecommunications network operated by the Division of Information Systems and Communication. The state leased backbone consists of a TDM network, over multiple DS-1 lines. KANWIN and KANREN are virtual networks that make use of the backbone. The state will begin to convert to ATM by mid-1999 where it is cost effective to do so. Depending on the outcome of E-rate discussions, it is anticipated that early 1999 will connect all school districts through KANWIN to the Internet.

■ ***Technology Assistance for Kansas Educators (TAKE)***

The State Department of Education has created an electronic service bureau called TAKE, which is a team of 21 experts assembled to review and certify all public and private schools' technology plans. TAKE conducts statewide workshops to assist school officials with understanding E-rate and with the completion of certification.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Whenever a new state agency is established, there is always a period of time that is required before it is able to carve its own identity, assess its needs, and begin to implement changes. Unfortunately, technology waits for no one. New state agencies given the responsibility for technology and telecommunications planning can expect short grace periods before they are expected to produce results. Kansas chose to establish a new agency and a new position—the Kansas Information Resources Council and the state's Chief Information Architect, respectively—to coordinate the planning and implementation of the state's technology plans, as opposed to investing such power in an existing state department or division. On the one hand, this approach creates a situation where all involved have to work through an inevitable maturation process, which may lead to some front end frustration. On the other hand, with a new agency whose sole command is to oversee planning, Kansas may be laying the foundation for a more effective and responsive arrangement in the long run.

KENTUCKY

ACRONYMS AND NETWORKS

- CPE—Council on Postsecondary Education
- CVU—Commonwealth Virtual University
- DIS—Department of Information Systems, under Finance and Administration Cabinet
- KCTCS—Kentucky Community and Technical College System
- KERA—Kentucky Education Reform Act of 1990
- KET—Kentucky Educational Television
- KETS—Kentucky Education Technology System
- KIH—Kentucky Information Highway
- KIRM—Kentucky Information Resources Management Commission
- KTLN—Kentucky Telelinking Network

EXECUTIVE SUMMARY OF THE STATE

The *Kentucky Education Reform Act (KERA)* of 1990 paved the way for many of the initiatives that now put the commonwealth ahead of most others in the delivery of distance education and use of technology. The Kentucky Education Technology System (KETS) has pushed Kentucky schools to achieve more equitable access to technology for education in K-12 schools, and the legislature and governor continue to lend support. The KETS program has completed connections to the statewide Kentucky Information Highway (KIH) for each of the 176 school districts, and all schools will be connected by the year 2000.

Higher education has been reorganized under the Council for Postsecondary Education (CPE). This Council takes the lead for coordinated efforts among the higher education institutions. Higher education in Kentucky has had an aggressive distance learning program for several years, and these efforts have driven advances in the technology infrastructure of the state. The 1997 statutory mandate to develop a Commonwealth Virtual University is leading to expansion and upgrade of already existing distance learning networks.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Kentucky's strength in distance learning lies in its service to K-12 education. Kentucky Educational Television (KET) has long been a leader in providing education via telecommunications in the state. KET has established a statewide satellite network, with over 1700 downlinks at schools, public libraries, higher education institutions, and most state agencies. Conversion of this system to a digital format began in 1996.

The commonwealth's *Master Plan for Educational Technology* was adopted in 1994, as part of the mandate of the *Kentucky Education Reform Act*. The Plan, due for its second revision in 1998, has guided the deployment of technology in the K-12 sector. Implementation of the statewide backbone began in 1994, and by 1995 connectivity was completed to each of the school district hubs.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Kentucky Information Resources Management Commission (KIRM)***

The General Assembly created the Kentucky Information Resources Management (KIRM) Commission in 1994 as an independent agency of the state government to guide strategic information technology planning. One of the Kentucky Information Resources Management Commission's major responsibilities is to provide overall leadership, policy direction, strategic planning, and coordination of information resources management for the executive branch of state government and public universities. As part of its planning responsibilities, the KIRM Commission adopted the *Commonwealth of Kentucky Strategic Information Technology Plan* on July 1, 1997. KIRM is also served by the Communications Advisory Council (CAC) for the development and coordination of statewide communications plans. One of CAC's first actions was to propose an integrated statewide communications backbone for use by state government agencies and other jurisdictions. The result is the Kentucky Information Highway.

■ ***Council on Postsecondary Education (CPE)***

Efforts by the governor and the passage of House Bill 1 in May 1997 meant fundamental reform and restructuring for higher education in Kentucky. As a result of the legislation, all postsecondary education institutions, which include eight public universities, 14 community colleges, and 15 technical colleges, are now under the Council on Postsecondary Education (CPE) for policy leadership and coordination. The CPE replaces the former Council on Higher Education. The recently established Kentucky Community and Technical College System (KCTCS) will manage the community college system, which was previously overseen by the University of Kentucky and the Kentucky technical college system, which was previously controlled by the Workforce Development Cabinet (WDC).

The CPE has an extended campus policy (carried over from the Council on Higher Education's policies) that designates service areas for each institution. Delivery of a course in another delivery area requires permission of that institution, which the CPE has the power to override.

The coordination and development of a Commonwealth Virtual University is one of the mandates given to the CPE in House Bill 1, which put distance learning at a focal point within the state while enabling further reforms of the postsecondary education system. New CPE responsibilities include the development of a strategic agenda, the authority to revise university missions, and the establishment of guidelines for technical school, college, and university access to six strategic incentive trust funds. The CPE also assumed traditional duties, such as academic program review, accountability system development and implementation, and operating and capital budgeting recommendation and oversight. The CPE has been given authority over the postsecondary institutions, thus enabling greater coordination.

■ ***Kentucky Department of Education (KDE)***

The Kentucky Department of Education's educational technology efforts have centered on the Kentucky Education Technology System (KETS) program. The Office of Educational Technology has responsibility for implementing the *KETS Master Plan* and the annual Implementation Plan. The *KETS Master Plan* focuses on equity issues, and equity provisions have rapidly closed the technology disparity between the highest and lowest income districts. Professional development for teachers has been a major cornerstone of the KETS program, and the KDE leads those efforts.

THE DRIVING FORCE

Kentucky's present infrastructure for delivery through technology results from leadership provided by higher education and several of its institutions. Unlike the situation in many other states, the institutions themselves in Kentucky are responsible for the collaboration. The KTLN and the Commonwealth Virtual University serve as examples of the cooperative projects stemming from higher education institutions.

THE PLANS

■ ***Commonwealth Virtual University (CVU)***

The *Higher Education Improvement Act of 1997* submitted by the presidents of the various higher education institutions in the state included a proposal for a Commonwealth Virtual University. The Council on Postsecondary Education has been given primary responsibility for developing the CVU, and institutions will assume primary responsibility for developing and providing the courses. The CPE created a Distance Learning Advisory Committee, which consists of nine college presidents (including one representing KCTCS), CPE members, and experts in the field of distance learning and information/telecommunications systems. As the CVU initiative is still in its planning stages, its final form remains unclear. However, the restructuring of the postsecondary education system will allow changes to be made to create a seamless system of education.

The Council on Postsecondary Education undertook a comprehensive survey of higher education technology capabilities, covering everything from the use of desktop PCs to plans for extensive distance learning programs at each institution. The findings were to be made available in mid 1998, and will be instrumental in helping guide the development of the CVU.

■ ***The Kentucky TeleLinking Network (KTLN)***

The Kentucky TeleLinking Network (KTLN) originated as a project connecting the networks at Murray State University, the University of Kentucky, and Western Kentucky University. These universities had worked with the Department of Information Systems (DIS) and the former Council on Higher Education to create the interactive compressed video network among higher education sites. Star Schools funding in 1996 supported a two-year, $12 million grant to expand the KTLN's reach in the K-12 sector. KTLN has involved the collaboration of K-12 schools, higher education, and DIS, and has established KET as an administrative home. The result is a network of networks connecting 130 sites directly, and interconnectivity capabilities with over 70 other locations in the state. Originally funded through state allocations and grants, operating costs are now built into the budgets of participating institutions, and the network receives little centralized financial support.

■ *Kentucky Education Technology System (KETS)*

The Kentucky Education Technology System (KETS), as the technology strand of the *1990 Education Reform Act*, deploys voice, video, and data technology to each of the Commonwealth's 37,900 pre-school through grade 12 public school classrooms to increase student performance and school success. KETS' implementation is guided by the *KETS Master Plan for Education Technology* under the authority of the Kentucky Board of Education. Originally issued in 1992, the *KETS Master Plan* underwent a revision in October 1996 and will be updated again in 1998. KETS aims to achieve a computer: student ratio of 1:6, with full WAN access from every classroom through a high speed district connection. Statewide equity for funding, resources, buying power, and learning opportunities is the most unique and rigorous principle guiding this initiative.

Implementation of KETS reached every district hub by the fall of 1995, and as of December 1997 reached over 1000 of 1400 schools in Kentucky. Due to funding limitations, the timeline for completion of connectivity through KETS has been pushed back to the year 2000. Additional funds for KETS may be appropriated during the 1998-2000 legislative session. An additional $55 million to $60 million may be made available annually by the state legislature.

■ *E-rate*

The Kentucky Department of Education (KDE) is filing a statewide E-rate application with the Federal Communications Commission. Kentucky districts and schools will not complete and file individual applications. KDE will also coordinate and aggregate, when possible, subsequent funding requests and reporting processes to minimize the filing burden on schools and reduce the number of individual applications which have to be processed at the federal level.

■ *Kentucky Educational Television*

Kentucky Educational Television (KET) is working to offer a Resources on Request service for teachers. Information on a particular subject area not already available at KET would be compiled from existing video, web, and printed resources. This information would be distributed to teachers within two to three weeks. In addition, to its open broadcast capability, KET has three digital channels directed to some 1700 sites in Kentucky. Additional channels may be added in support of the CVU.

THE FUNDING SOURCES

The total cost of the *KETS Master Plan* implementation was estimated in 1993 to be $560 million. Due to cost reduction and avoidance policies, proactive management of procurement strategies, and industry pricing trends, the total cost of the same plan was revised in 1996 to be just over $422 million for the initial implementation. Ongoing maintenance costs are projected at $65 million to $70 million annually beginning in 1998-2000. KETS receives approximately two percent of the annual budget for P-12 education in Kentucky.

KETS is funded at the level of $35 million per year, with $323 million committed over the last five years. The Governor and legislative leadership are committed to a funding level of $110 to $120 million for fiscal year 1999 (in conjunction with the USF program) to complete the KETS objectives by fiscal year 2000. State funding of KETS is matched at the local level.

Kentucky uses Technology Literacy Challenge Funds (TLCF) to advance the Kentucky Education Technology System program objectives, which are consistent and more comprehensive than the TLCF objectives. Kentucky received $3.5 million to distribute to local districts, and $6.9 million is available in the second year of the program.

TECHNOLOGY

- ***Kentucky Information Highway (KIH)***

The Kentucky Information Highway (KIH) was created through a contract with 20 LECs headed by BellSouth and LCI International. All state agencies, K-12, higher education, and other political subdivisions use the system for long distance voice and data communications. Backbone bandwidth is available up to T-3. Frame relay is available, and migration to ATM is expected. Connections to schools and school districts through KETS make use of the KIH.

- ***The Kentucky TeleLinking Network (KTLN)***

KTLN now reaches 130 sites throughout Kentucky, including 50 higher education sites and 60 K-12 sites. The network is based on VTEL compressed digital video conferencing systems, with transmission rates of 384 Kbps. Higher transmission rates are possible when needed. Connectivity with over 200 total compressed video sites is possible via compressed video for telemedicine, corrections, and other needs through the KIH. Educational applications receive priority on the network for all institutions. Programming and origination is accomplished from the bottom up, with a large percentage originating from or delivered to K-12 institutions for advance placement, dual credit, and university credit.

- ***Higher Education***

Among current efforts in distance learning programs, Western Kentucky, Murray State, Morehead State, Eastern Kentucky, and University of Kentucky are among the most active, though all public institutions and some independent institutions also participate. Programs in distance learning consist of courses that are easily translated from a live classroom to compressed video classrooms.

Compressed video over the KTLN is the primary delivery mode. Each university has three to six on-campus compressed video classrooms (send and receive) and there are two to four classrooms (also send and receive) at each of several university Extended-Campus Centers. All community colleges also have at least one compressed video classroom.

Satellite delivery is expected to grow rapidly with the recent addition of two digital channels at KET and the installation of uplinks at four public universities. The higher education institutions are requesting funding to install uplinks at the two remaining institutions. Prior to 1997, only three institutions were able to reach KET's uplink (via microwave).

In the fall of 1996, a total of 6,900 students in Kentucky's public institutions enrolled in 420 courses offered at a distance. Western Kentucky University, for example, in the fall of 1997 offered 39 interactive television/compressed video courses with 880 enrollments, and nine broadcast telecourses with 148 enrollments. World wide web based courses are under development at all institutions.

Several Kentucky institutions offer courses through the Southern Regional Electronic Campus (SREC).

Another new development has been the community-driven Greater Louisville effort to get a GigaPoP on the Internet installed at the University of Louisville. This development may lead to a statewide intranet - which would result in potentially lower transmission and Internet access rates, as well as increased performance within the state.

■ ***Kentucky Telecommunications Consortium***

The state legislature created the Kentucky Telecommunications Consortium in 1978 to provide college credit television courses to distance learners throughout the Commonwealth. The Kentucky Council on Postsecondary Education provides funding for the consortium offerings and Kentucky Television manages the program.

■ ***K-12***

In just 11 months, Kentucky has established high speed (56KB or above) Internet and information data pipes directly into every one of its 176 school district locations to be used primarily for instructional purposes. KETS will have connected 1156 schools to the Internet by mid 1998, with either 56 Kbps or T-1 connections.

The Kentucky Department of Education and K-12 schools have worked cooperatively with higher education institutions, especially with the coordination of the Council for Post Secondary Education. Cooperative activities include in-service training, research and evaluation, delivery of Advanced Placement classes for students, and curriculum development and testing.

■ ***Kentucky Educational Television (KET)***

KET offers seven courses, five days per week, to junior and senior high schools. These courses reach audiences in 19 states via SERC broadcasts. KET also broadcasts college credit telecourses with 7000 enrollments annually. KET serves over 1750 sites via satellite network for point to multi-point broadcast, and annually provides 150 instructional series to elementary/secondary schools. KET produces more than 90 hours of professional development seminars for educators. Teachers in 97 percent of Kentucky school districts have registered to participate.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

To what factors can Kentucky's outstanding efforts in distance learning be attributed? Two key issues have paved the way for the state's success. First, Kentucky has benefited from forward thinking infrastructure planning and coordination. Input from Kentucky Educational Television, educational institutions, the Department of Information Systems, and the Department of Education has resulted in a synergy of infrastructure activity other states can only admire. Second, with regard to K-12 initiatives, Kentucky learned earlier than other states to use technology to redress economic and social inequities. Because of the state's requirement to develop the means to reach formerly disenfranchised students, Kentucky was able to create and put into place a technology-based system to help resolve educational inequities. Institutions of higher education have been instrumental in aiding K-12 efforts in the state, and, as the Commonwealth Virtual University project illustrates, they are now further refining their own distance learning capabilities.

LOUISIANA

ACRONYMS AND NETWORKS

- LaNet—Statewide Telecommunications Network
- LCET—Louisiana Center for Educational Technology
- LPB—Louisiana Public Broadcasting
- LSU—Louisiana State University
- OTM—Office of Telecommunications Management, under Department of Administration

EXECUTIVE SUMMARY OF THE STATE

Distance education efforts and the state's telecommunications infrastructure revolve around the resources of Louisiana Public Broadcasting and institutions of higher education. Both the K-12 sector and higher education have seen exciting developments in the role of technology-based learning over the past few years.

The Board of Regents (BOR) has assumed responsibility for promoting the cooperative development of distance learning among the three university systems. BOR provides incentives to collaborate and cooperate on distance learning programs. The existing compressed video networks that connect most of the institutions are expanding to reach every campus under a Board of Regents program, nearly doubling the total number of sites.

The legislature has also taken a keen interest in promoting the use of educational technology in the K-12 sector. In 1995, the legislature formed the Louisiana Center for Educational Technology, which coordinates distance learning efforts for the Louisiana Department of Education. The legislature also funded the Classroom Based Technology Fund (CBTF) at $37 million dollars in its first year. Intensive and pervasive state, regional, and district planning, propelled by the establishment of the CBTF, has allowed the state to make quick gains in its implementation of technology. The state has also continued to support professional development efforts.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Until recently, K-12 participation has been missing from Louisiana's involvement in educational telecommunications and technology. The consequence of this lack of involvement and commitment of resources became apparent in 1995, when the state's last ranking in its ratio of computers to students was published. If nothing else, this realization led to increased funding from the state legislature to support technology in the public schools.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Office of Telecommunications Management (OTM)***

The Office of Telecommunications Management establishes and coordinates telecommunications systems and services affecting the management and operation of the executive branch of Louisiana State government. OTM also acts as the sole centralized customer for telecommunications systems and services and as a billing agent for respective user agencies.

■ ***Board of Regents (BOR)***

In 1997, the Board of Regents (BOR) restructured its distance learning policies. The BOR now acts as an oversight organization for the University of Louisiana System, Louisiana State University System, and the Southern University System. The BOR coordinates and reviews all higher education networks and course offerings. Many of the private colleges, though not statutorily obligated to the BOR, voluntarily participate in the BOR activities. Louisiana has moved past "turf" and competition issues to enter into an arena of coordination, reduction in duplication of efforts, and maximizing the available resources. Programs and incentives have been established to accomplish some of the coordination goals, and funds have been appropriated over the next three to four years for equipment and infrastructure. The Board of Regents established a state wide compressed video network, involving all institutions under the Board of Regents' umbrella.

The Southern Regional Electronic Campus (SREC) coordinates the BOR's Internet course offerings. Authorization has been granted for one associate's degree, one 2+2 degree, and one master's degree by the fall of 1998, although not all of these programs will be in place at that time. It is projected that Louisiana institutions will provide 12 courses in the SREC by the fall of 1998.

Louisiana Department of Education (LDE)/Louisiana Center for Educational Technology (LCET) The Louisiana Department of Education oversees K-12 educational technology efforts through the Louisiana Center for Educational Technology (LCET). The 1996 Statewide Plan for Educational Technology called for the creation of the center, which opened in July of 1997. The LCET administers the Classroom Based Technology Fund (CBTF), distributes grant money, approves technology plans, and coordinates professional development and E-rate efforts. Implementation of technology in the classroom is decentralized through the CBTF.

■ ***Louisiana Public Broadcasting (LPB)***

The state legislature designated Louisiana Public Broadcasting (LPB) as the Statewide Educational Technology Resource Center in 1996. LPB immediately created a help desk staffed by a technician to respond to technical problems and provide assistance for grant writing. LPB also designated a content expert to work with teachers already familiar with technology who need additional information about integrating technology into the classroom. LPB has operated an award-winning web site since 1995, offering information about all LPB services and a searchable resource center for teachers.

THE DRIVING FORCE

In higher education circles, the new Commissioner for Higher Education proactively sought to establish increased coordination among the Board of Regents institutions.

With regard to K-12 education, several issues spurred recent centralized planning efforts in educational technology. The first impetus stemmed from the unhappy news that Louisiana ranked last in 1995 among all the states in the ratio of students to computers and students to multimedia computers. A second stimulus for educational technology activity was several 1995 federal Technology Literacy Challenge Grants, which enabled five school districts to demonstrate the capabilities and power of introducing technology initiatives into education.

THE PLANS

■ *State Plan for Educational Technology*

The state Department of Education adopted a *Statewide Plan for Educational Technology* in the fall of 1996. A major piece of that plan called for the formation of the Center for Educational Technology (LCET). The LCET has helped move the state rapidly toward its State Educational Technology Goal: "All educators and learners will have access to technologies that are effective in improving student achievement." The original target set by the Statewide Plan was to have a 5 to 1 ratio of students to multimedia computers by the year 2001. Although this is unlikely, Louisiana attained a ratio of 27 students to 1 multimedia computer as of March 1998.

■ *Classroom Based Technology Fund (CBTF)*

The Classroom Based Technology Fund, passed in 1997, decentralized the implementation of technology in the classroom, giving control over to the local school districts. All 66 school districts and eight regions, as well as 76 non-public, independent, and Diocesan school systems have submitted technology plans and applications for CBTF funds to the LCET for approval. Each technology plan submitted must have content, training, and maintenance strategies, and have high standards for equipment procurement. Under the CBTF, schools receive funding for hardware and basic internal network infrastructure. Districts themselves assume transmission, maintenance, and recurring expenditures for connections to the Internet. More than half of the spending thus far has gone for the purchase of computers, while about 20 percent of the monies has covered costs associated with Internet networking, and the remaining 23 percent of the funds have been applied to other technological items such as software, calculators, scientific equipment, and projection devices. Professional development needs are funded under three different programs. These are providing a total of $27.3 million from 1997 through 1999.

■ ***E-rate***

E-rate efforts concentrate on information dissemination and technical guidance. The Louisiana Center for Educational Technology has sponsored seven workshops for E-rate applications. LCET, having worked closely with all eight regions in developing regional plans for technology activities, is also working with regional applications for E-rate.

■ ***Development of K-12 Interactive Distance Learning Network***

The Louisiana Center for Educational Technology is further developing its distance learning program through an interactive distance learning network. In the spring of 1998, the Board of Elementary and Secondary Education considered plans for a compressed video network. Twenty-three universities will be connected to the network by the end of the year, and the K-12 sector is looking for funding of regional sites and one statewide centralized site, from which training and professional development services can be conducted.

■ ***Louisiana Public Broadcasting (LPB)***

As part of the School-to-Workforce preparation program, LPB has installed 50 digital satellite receive sites on all 44 technical college campuses. Additional sites are to provide core courses in math and science, as well as professional development and videoconferencing. One digital uplink is maintained at LPB.

In March 1998, an electronic classroom was installed at LPB to provide hands on electronic training for teachers. As part of the Board of Regents compressed video network, a compressed video classroom will also be installed at LPB allowing direct connection to all of the institutions of higher learning. The compressed video network will also connect with the satellite delivery system, allowing the transmission of courses across the medium.

THE FUNDING SOURCES

Initially, $38.1 million in funding was approved for the Classroom Based Technology Fund (CBTF) in July 1997, and of this amount $1 million was to go toward expanding the Greater New Orleans Freenet beyond the New Orleans area. The Freenet is a dial-in resource for teachers and students. The funding request for 1998-99 is $35 million, and if approved, these funds will bring the ratio of students to computers to 20:1. The Louisiana Center for Educational Technology hopes to have CBTF funding included as a standard budget item in the future.

Professional development efforts are supported by Technology Literacy Challenge Funds (TLCF) and an LA Learn (the LA Goals 2000 program) grant.

TECHNOLOGY

The LaNet is a statewide router based data network managed by the Office of Telecommunications Management serving state agencies, higher education, K-12, and political subdivisions. There are over 140 dedicated subscribers, including virtually all colleges and universities, state agencies, and technical colleges. K-12 connections from 56 Kbps to T-1 can be obtained. The network is in the process of migrating to an ATM environment.

Compressed video networks are already in place at Louisiana State University (6 nodes, offering 30 courses per semester); LSU Medical Center (30 nodes); Northwestern State University (8 nodes, primarily used for its nursing program); and Southern University System (3 nodes, one at each of its institutions). The compressed video network will expand to all campuses under the Board of Regents activities by January 1999. This expansion will add 53 sites to those already in existence. Primary connections will be via leased T-1, with upgrades to ATM anticipated in the next 18-24 months. Negotiations are also being carried out with the National Guard, which is instituting a compressed video program under their Guardnet 2000 program.

Although satellite uplinks exist throughout the state and some regional networks are in place, satellite is no longer widely used for the delivery of distance education, primarily due to a lack of funding. Courses broadcast through Louisiana Public Broadcasting are the notable exception to this. LPB has maintained compressed digital satellite delivery through two channels on Telstar 401 since 1994. Northwestern State University has a satellite network, but currently offers no credit courses.

Louisiana relies on a mixture of technologies for delivery of distance learning courses. Higher education is pursuing making a transition to more widespread Internet use and away from its previous use of audiographics. Compressed video is heavily used, and satellite broadcasts mainly rely on LPB. Through the diverse array of delivery mechanisms, the Board of Regents institutions electronically offered a total of 136 courses during 1997.

■ ***Louisiana State University System***

There are five main campuses in the LSU system, housing nine institutions. Each of the institutions in the system undertakes its own distance learning programs and efforts. Most distance learning within the system makes use of the compressed video network connecting the five campuses. About 30 courses per semester are offered systemwide over the video network, with approximately one-third of those courses originating from LSU-Baton Rouge.

By the fall of 1998, each of the five LSU campuses will have multiple compressed video classrooms. As part of the incentives offered by the Board of Regents, line charges will be offered at declining discounted rates over a four year period. Bids opened for equipment listings in April 1998. Each institution received funding to implement telecommunications infrastructure development efforts, which will be through an approved vendor list.

Metro cable networks provide local delivery of telecourses in the Baton Rouge area, and LSU-Baton Rouge is preparing for the use of the Internet as a delivery mechanism, although few offerings currently exist. The LSU System Telecommunications Council meets regularly to discuss and plan for administrative and other needs within the system.

■ *Northwestern State University (NSU)*

NSU is the only university in Louisiana offering Internet courses and degrees. The university offers six to eight web courses per semester. Three Internet degree programs will begin in the fall of 1998 in Elementary Education, RN to BSN, and Professional Writing. There are currently seven compressed video sites among the main campus, three regional campuses, and three hospitals. Another two sites are expected to be connected by the fall of 1998. These are used both for telemedicine and delivery of academic courses, which number between 20 and 28 per semester. The network is operated solely by NSU, but Louisiana Public Broadcasting uses it for delivery of courses as well, both by videotape and real-time broadcast.

Learn Link, a high quality desktop video project, will begin operations at NSU in the fall of 1998. Learn Link, also called I-Link will bring desktop video conferencing into five rural areas as part of a $300,000 federal Rural Development Grant, which NSU matched at 200 percent. The project aims to bring community and workforce development as well as academic opportunities to those areas.

■ *K-12*

K-12 distance learning efforts make use of LINKS, a satellite network to public schools. There are 92 C-band, Ku-band, and digital satellite downlinks on this network, established mostly through SERC and state funding. These links deliver professional development, credit, and non-credit enrichment high school courses. Programs are generally offered using one-way video and two-way audio. There are also 104 computer telelearning network sites, which rely on an audiographics based platform.

■ *Louisiana Public Broadcasting*

LPB delivers college credit courses for all 24 of the higher education institutions, and provides course programming for at least 12 of them. LPB also supplies instructional and other programming to K-12 schools through LINKS.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Louisiana is a rural, economically strapped state that has made significant progress in distance education in a short amount of time. In the past, most telecommunications and technology initiatives originated in Louisiana Public Broadcasting, while the institutions of higher education and the state Department of Education were content to rely on whatever LPB provided or conduct small scale projects of their own. Although LPB still offers first rate programming and services for educators, other entities have become more skilled in distance learning. Like many states, Louisiana values local decision making by school districts, which in some situations can lead to fragmented educational technology initiatives. What is notable in Louisiana's case is the fact that the entire state rallied around the news of the state's dismal performance in providing a sufficient number of computers to its students. The state Department of Education used this information to its advantage to help secure funding for classroom technology. The next couple of years will reveal whether the boost to Louisiana's K-12 educational technology will remain a long-term concern in the state or will be pushed aside by competing demands. In higher education, Louisiana has turned towards more centralized coordination of technology planning through the ministrations of the Board of Regents. If the BOR institutions can continue to pursue cooperative planning and sharing of resources, the state is likely to shed its past unimpressive reputation in distance learning. Louisiana might still prove to be a force in distance education among the southern rural states.

MAINE

ACRONYMS AND NETWORKS

- ATM—Advanced Telecommunications for Maine (DOE ATM project)
- BIS —Bureau of Information Services, under the Department of Administration and Finance
- CAPS—(University of Maine System) Computing and Data Processing Services (formerly)
- DAFS—Department of Administrative and Financial Services
- ENM—Education Network of Maine (formerly)
- MSLN—Maine School and Library Network
- UMS—University of Maine System
- UNET—University of Maine System Network for Education and Technology Services

EXECUTIVE SUMMARY OF THE STATE

The State of Maine holds a place in the forefront of distance learning via its technological infrastructure, which relies on broadcast capabilities through a higher education fiber/ ITFS system and the development of an ATM project through the Department of Education. Within higher education, the former Education Network of Maine (ENM) and the University of Maine System (UMS) Computing Services have recently combined to create the UMS Network for Education and Technology Services, also known as UNET. This restructuring allows the continued growth of the distance learning program offered through the ENM while maintaining versatility of the underlying technology. This move also recognizes the increasing importance of technology services in the University System by creating UNET as a division that reports directly to the Vice Chancellor for Academic Affairs.

As the state's Department of Education ATM project moves into its implementation phase and UNET redefines its role within UMS, the possibility of aggregating services into a single network is under consideration. A task force has been created that will consider this collaboration and create new ways to make the public investment in technology more efficient. The task force will deal with issues relating to coordination of capital investment for services and equipment, and governance of a system infrastructure that includes different entities with different needs. Balancing the need for coordination to enable connectivity while retaining each institution's own freedom to obtain and manage services are key points for discussion.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Planning for educational telecommunications in Maine began in 1986, when UMS charged the University of Maine at Augusta (UMA) with implementing a statewide educational telecommunications system. The "community college system without walls" set out to serve a state which lacked a community college system, and had low college attendance rates because only one-third of the population lived within a reasonable commuting distance of a college. UMA inaugurated the Education Network of Maine (ENM) in 1989 in consultation with several other University campuses, Maine's Technical College System, Maine Maritime Academy, Maine Public Broadcasting, New England Telephone and the Department of Education. ENM depended on an interactive television system utilizing a leased fiber backbone connecting the UMS campuses, and broadcast courses via ITFS from those campuses to the various receive sites.

ENM's exclusive relationship with the UMA campus was challenged and disbanded in 1994, creating a more accessible and equitably distributed resource to serve the entire University of Maine System. A proposal to make the ENM a degree-granting arm of the UMS was vehemently opposed in 1995. In May 1996, UMS' Chancellor formed a System-wide Task Force on Telecommunications and Information Technology, which evaluated the University of Maine System's information technology infrastructure and activities and developed a multi-year plan. Plans to harness the rapid changes in technology to create a more effective distance learning system resulted in a recommendation to merge the Education Network of Maine with the UMS Computer and Data Processing Services (CAPS) to create UNET, the University of Maine System Network for Education and Technology Services. UNET's implementation began in the fall of 1997. UNET now reports directly to the Vice Chancellor for Academic Affairs, a recognition of its role as a system-wide resource.

In K-12 education, the State Board of Education and the Department of Education are leading the effort to make real a proposal brought forth by the governor (LD 1939) to create a statewide educational telecommunications infrastructure capable of supporting two-way full motion interactive video. The $15 million bond issue, approved by Maine voters in 1995, will pay for switching and routing equipment and video classroom equipment for 170 high school and library sites in Maine. Bell Atlantic will provide the high speed, ATM networking infrastructure. The one-year pilot phase involving seven sites was completed in the fall of 1997, and RFPs have been released for providing the classroom equipment. Installations at the new sites are scheduled to begin by the fall of 1998. Bond money will be available at least until year 2000.

The Maine School and Library Network (MSLN), provides Internet service to all schools and libraries of the state. MSLN is the result of a 1994 ruling by the Maine Public Utilities Commission, which required NYNEX (now Bell Atlantic) to fund telecommunications services for public libraries and accredited schools in the state.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Task Force on Information Technology in the Public Sector***

Legislation passed in 1997, an *Act to Amend the Composition of the Information Services Policy Board and Establish a Task Force on Information Technology in the Public Sector*, called for a review and maximization of access to information through technological infrastructure by integrating technologies among agencies, schools, libraries, and political subdivisions. The Speaker of the House of Representatives convened this task force to consider and create new ways to make the public investment in technology more efficient.

■ *Department of Education (DOE)*

The Department of Education and the Maine State Board of Education have focused their efforts on developing an ATM network for Maine education. Education in the K-12 arena is decentralized and under local control, and the DOE makes no unfounded policy directives. The DOE is encouraging use of the current and planned delivery systems and helps establish models that emphasize the quality of the programs. Staff development and training compose an integral part of the DOE's efforts.

■ *University of Maine System Network for Education and Technology Services (UNET)*

Since UNET is still in its early stages, it remains to be seen how it will guide the state's planning and implementation of infrastructure and programming. A Steering Committee advises UNET. UNET already manages the Maine School and Library Network (MSLN), and the state's Bureau of Information Services (BIS) is considering reassigning the administration of the ATM network to UMS. Expansion of UNET's educational services will take place gradually according to the needs of students, rather than the possibilities of the technology.

There is no higher education coordinating board in Maine. Each of the seven institutions of the University of Maine System maintains a distinct level of autonomy in its services and programs, although they are unified under a single Chancellor. Collaboration among the institutions in the distance learning field is achieved through UNET.

The relatively small size of the state, especially in terms of its population, makes the decentralization of agencies and institutions easy to maintain. The ATM project, for example, is committed to allowing schools to develop, schedule, and administrate their own activities over the ATM system according to their particular needs, in an approach the commissioner of education termed "controlled anarchy."

■ *E-rate*

The Department of Education (DOE) disseminates information for the E-rate funds. Meetings have been held on the E-rate over the ATM network and UNET. Although the state intends to oversee a statewide application for POTS and ATM, other proposals will be left to individual institutions. Each school system in Maine received $2500 to develop community technology plans under a 1996 statewide program.

THE DRIVING FORCE

In recent years, the state's ATM project has led the state's educational technology efforts. Unlike the situation many other states face, the various educational technology projects in Maine have benefited from a sustained financial commitment to establish an infrastructure. This has taken place even as individual users and institutions have maintained the right to determine the development of their own programming and content delivery.

THE PLANS

■ ***Task Force on Information Technology in the Public Sector***

The Task Force will continue to develop its plan. Plans for integration of UNET's services and the ATM project have not been formalized, but are under consideration. Most stakeholders appear to appreciate the cost effectiveness and other benefits that would arise from combining resources. The Bureau of Information Services is cautiously approaching the regulation and standardization among the networks, with the view that such an action might limit the effective utilization of resources by any of the varied customers.

■ ***ATM Project***

The ATM project will enable two way interactive video, data, and voice transmission over a fiber optic ATM switched network connecting high schools and libraries in Maine. Content delivered over this network will be solely left to the schools using the network, and schools will assume responsibility for scheduling. ATM funding is available for 170 sites, which include all 158 high schools and vocational centers and seven libraries, plus an additional five sites to be decided. An additional 20-30 sites are expected to be added to the current network of seven pilot sites by the fall of 1998. The Department of Education coordinates the network's training and professional development.

THE FUNDING SOURCES

The $15 million bond issue that is funding the ATM project supports capital expenses only.

In February 1996, the President announced a new program known as the Technology Literacy Challenge Fund (TLCF). The $2 billion five-year program was created to help leverage state, local, and private sector efforts to improve teaching and learning with the use of technology to insure that all students are prepared to live and work in an increasingly technological society. The grant to a state like Maine is targeted at achieving the President's four goals for educational technology: ❶ all teachers will be trained to help students learn through computers and the information superhighway; ❷ all students and teachers will have access to modern computers; ❸ all schools and classrooms will be linked to the information superhighway; and ❹ high quality software and online resources will be part of the curriculum in every school.

In May 1997, Maine received a $1 million grant to meet the President's call to prepare students for the technological challenges of the 21st century. Maine planned to use the fund to award about 25 grants to school districts, including districts with the highest poverty and the highest need for technology. Additionally, extensive technical assistance will be provided to about 20 additional districts that are in the preliminary stages of developing technology plans.

TECHNOLOGY

■ *ATM project*

The ATM network will eventually connect up to 170 schools and libraries via a statewide, broadband ATM switched fiber-optic network. The full motion, fully interactive network will allow a maximum of four sites to simultaneously connect. The number of MCUs installed on the network will limit the number of such connections. A contract signed by the Department of Administration and Finance Services committed NYNEX to build the ATM telecommunications infrastructure for the network.

The pilot phase was completed in the spring of 1998. A quick negotiation of a contract for providing site equipment could allow up to 30 new sites to complete installation by September 1998. Schools that have identified and planned for their needs, courses, enrichment programs, participation, and sharing of resources over the network will be the first to install the equipment at their sites. Individual schools will provide course content and programming over the network.

■ *University of Maine System Network for Education and Technology Services (UNET)*

UNET offers courses over its combination fiber/ITFS/compressed video network that extends throughout the state. Interactive Television (ITV) classrooms exist at 105 locations, and 10 UMS Centers and 70 high school sites compose the majority of the system's users. The UMS Centers provide centralized services for all seven campuses and act as the main distribution centers for the distance learning program. Approximately 3500 students participate in courses each semester that lead to seven associate's degrees, five bachelor's and four master's degrees, in addition to certificate programs.

Included in UNET's ITV system are fibers that link the seven campuses of the UMS and enable the delivery of compressed 2 -way audio/video courses. Other sites receive point to multi-point microwave. Phones and other means of communication provide interactivity. The ITV system uses desktop conferencing, World Wide Web, and other technologies to supplement the interactive components of its courses. The ITV system also offers a handful of completely World Wide Web-based asynchronous courses.

The majority of UNET's programs originate at one of the campuses, though some are downloaded from outside institutions. UNET's satellite capabilities include one uplink and one downlink, which can then be distributed through the terrestrial system.

■ ***Maine School and Library Network (MSLN)***

As its name suggests, the Maine School and Library Network (MSLN) provides Internet service to the state's schools and libraries. This network resulted from a ruling by the Maine Public Utilities Commission (PUC) in a rate case that required NYNEX to fund telecommunications services for public libraries and accredited schools. The project is funded for five years at a rate of $4 million per year beginning June 1, 1995. A Board of Advisors operates MSLN and reports regularly to the Public Utilities Commission on the status of the project. The project provides each participating site the choice of a 56 kb connection and one free voice line with 22 hours of free toll calling, which could be used for dial-up service to the Internet. Currently, there are 821 schools connected through this program. Recognizing the importance of training, the MSLN plan calls for two types of training: basic training and technical training.

OTHER MISCELLANEOUS BUT RELEVANT INFORMATION

Legislation has been passed that gives the Public Utilities Commission explicit authority to establish a state Universal Service Fund. The fund is to be used to cover areas of training and end-user computers and equipment not covered by the federal program. No action has been taken on this.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Maine's topography and population have always been factors in the state's push for distance learning services. The state's small population and isolation contribute to locally controlled infrastructure operations. It is this recurrent theme of local control that has led to the recent decentralization of programmatic responsibilities in the state's ATM project. As the ATM network increases in size and broadens its services, the participants will grapple with the need to coordinate programming, a situation many institutions in Maine have not faced in the past. Maine is carefully weighing its current approach to centralization, and the decisions the state makes over the next couple of years, as well as the mistakes and successes it experiences, will influence the state's deep-seated dedication to local control.

MARYLAND

ACRONYMS AND NETWORKS

- FMIS—Financial Management Information Systems
- ITB—Information Technology Board
- MDE—Maryland Department of Education
- MEC—Maryland Electronic Capitol
- MHEC—Maryland Higher Education Commission
- MIDLN—Maryland Interactive Distance Learning Network *(now the official name on the website)*
- OIT—Office of Information Technology, under the Department of Budget and Management
- UMS—University of Maryland System

EXECUTIVE SUMMARY OF THE STATE

Efforts to coordinate resources in Maryland have accompanied the creation of an infrastructure within the state for distance learning and educational technology. The push to build infrastructure in Maryland has resulted in two major networks used for distance education. The Maryland Interactive Distance Learning Network (MIDLN) now reaches 110 sites with its full motion interactive video classrooms supplied through a partnership with Bell Atlantic. The Interactive Video Network (IVN) has found its niche within higher education, exclusively at the University of Maryland System campuses.

Coordination of educational telecommunications and distance learning in higher education has included both the Maryland Higher Education Commission (MHEC), and more recently at the University of Maryland System (UMS). MHEC, in its State Plan for Higher Education, outlines some of the goals for distance learning in higher education, with the intent of fostering the development of quality programs. UMS, beginning with a symposium in March 1997, is moving toward the coordination of delivery services, while allowing the individual institutions the freedom to develop their own distance learning programs.

A reorganization of the telecommunications agency within the state resulted in the transfer of the Office of Information Technology from the Department of General Services to the newly formed Department of Budget and Management, effective as of July 1996. The legislation significantly rearranged the Division of Telecommunications' organizational structure and functional responsibilities, with the result that the Division now more proactively engages in regulatory and legislative issues.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Maryland can proudly lay claim to having one of the first distance learning networks in the country, the "College of the Air," which was distributed through the state's Public Broadcasting Network. MIDLN, the Maryland Interactive Distance Learning Network, a full motion, interactive network, started in 1993 at the urging of the governor through a partnership with Bell Atlantic. MIDLN serves the needs of the Department of Education, higher education, and state government agencies. The initial expectations for the network were to connect over 400 participants. Cost factors and inter-LATA communication regulations, however, have slowed network growth. Less than one-half of the 270 high schools, community colleges, and universities signed on to the project by 1994. Currently there are 110 sites on the network, which has only become a statewide network in 1998 with the passage of subsidies to alleviate inter-LATA charges.

The Interactive Video Network (IVN), developed by the University of Maryland System, serves the needs of higher education for interactive distribution of courses. UMS has also been actively involved in distance learning, with international consortia dating back to 1980.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Office of Information Technology (OIT)***

The Office of Information Technology, within the state's Department of Budget and Management, is responsible for the State's *Information Technology Master Plan*, as well as developing, maintaining, and enforcing statewide information technology standards, policies, and procedures. The OIT is also responsible for making recommendations to the Secretary of Budget and Management, including maintenance of the Information Technology Investment Fund, the centralized funding mechanism for the state. As the head of OIT, the Chief Information Officer oversees three divisions: Telecommunications, Financial Management Information Systems (FMIS), and Planning, Standards, and Technical Assistance. The 21-member Information Technology Board (ITB), which includes representatives from K-12 and higher education, as well as Maryland Public Television, provides advice and counsel to the CIO in the development of the *Information Technology Master Plan*. Education is one of the focal points of all planning documents coming out of the OIT.

■ ***Maryland Higher Education Commission (MHEC)***

Two groups work with the MHEC or assist the MHEC directly in its coordination of distance learning. First, the Governor's Commission for Technology in Higher Education advises the state's role in funding infrastructure both for a statewide network and infrastructure on campuses. Second, the Educational Technology Policy Council, an advisory group for the MHEC comprised of senior campus administrators guides all areas of information technology, not just distance education. The Council is supported by the Distance Learning Users Council, composed of hands-on distance learning administrators and faculty, limited in scope to issues of distance learning.

■ ***Maryland State Department of Education (MSDE)***

The Maryland State Department of Education formed a Blue Ribbon Committee in July 1992 to develop a vision and a strategy for technology in Maryland education. The committee's recommendations were put forth in a report entitled *The Maryland Plan for*

Technology in Education. Several specific plans have been implemented to assist in realizing these goals. The Governor moved to support technology in education by establishing "Maryland Connected for Learning" in the spring of 1996. The mission of that initiative is to wire and equip all the schools, as well as to train the staff, so that all the students and teachers have access to information and communication resources.

The MSDE is involved in two key components of this initiative. First, the Technology in Maryland Schools Program, a 5-year commitment by the State, provides a complete wiring distribution system throughout the school buildings. Computer workstations and funds for software and staff training will also be provided. Second, Maryland's Netweekend provides an opportunity for volunteers to assist in wiring the schools and training the staff for Internet connection.

THE DRIVING FORCE

Governor Shaefer initiated the Maryland Interactive Distance Learning Network (MIDLN) in 1993, and despite ambitious beginnings, the growth of the network has been slowed by both cost and inter-LATA exchange issues which make participation expensive for schools. The University System has followed its own path in developing infrastructure to promote distance learning, and until now its institutions have operated independently in organizational as well as practical terms.

THE PLANS

■ *Office of Information Technology*

The Office of Information Technology and its Information Technology Board will update the *Information Technology Master Plan* to ensure the state is following a prudent path concerning information technology. The plan was first adopted in 1995 to move information technology planning away from disjointed, individual agency efforts in order to gain efficiency, coordination, and cost benefits. Improvement of education is one of the main goals of the plan. The Maryland Electronic Capitol (MEC), the state government's equal access initiative to state information, was created by the plan's original recommendations. The state has leased an infrastructure through Bell Atlantic to maintain robustness in procurement and use cycles, as well as avoiding the need for further technical expertise. The state is expected to begin to focus on the aggregation of several, formerly independent networks that are now under state operation: MIDLN, FMIS, the State Lottery Network, and the state Data Backbone Network.

■ *Legislation*

The 1997 legislative session passed House Bill 1124, which subsidizes inter-LATA communication for distance education. MIDLN benefits most from the action. The bill appropriated $500,000 each year until 2002, and will cover the cost of transport and switching across LATA lines. It will reduce the monthly costs of using the MIDLN from its current rate of

$2150 per month to less than $400 per month. This appropriation makes it possible to refer to the MIDLN as a true, cost-effective statewide backbone.

- **Higher Education**
- **Maryland Higher Education Commission (MHEC)**

The Maryland Higher Education Commission will continue to be a catalyst rather than a player in promoting distance learning efforts in the state. To this end, MHEC has requested funds for programs to foster information technology projects.

MHEC adopted the *State Plan for Postsecondary Education* at its November 1997 meeting. The final plan was published in January 1998, at which time implementation strategies and probable costs were developed to guide the budget submission for the fall of 1998. Institutions are bound to the policy directions set forth in the document, but not to specific actions. Key recommendations relating to distance learning lie under Goal 8 of the plan, including the establishment of a statewide Office of Distance Education under MHEC to facilitate cooperation among institutions, provide a central point for data collection, and assure quality and access to programs; establishment of standards-based networking through the ITB to achieve maximum connectivity; establishment of a program for Educational Telecommunications Grants; training and training incentives; and establishment of a virtual university.

MHEC is also staffing and coordinating the Governor's Commission on Technology in Higher Education. One goal of the Commission is to develop a coherent policy for technology growth and integration.

The Maryland Higher Education Commission identified training as an essential component of MIDLN. Through grants, the Commission created in-state expertise to carry out the needed training. Using funds provided by MHEC, Charles County Community College offers three-day workshops four times per year. Since these workshops include only a few of the most involved faculty and administrators statewide, a much larger program is needed to reach the majority of faculty.

- **Virtual University**

The *State Plan for Postsecondary Education* encouraged the development of a virtual university. The virtual university will not exist as a separate institution, but will have some form of administrative arrangement that utilizes one or more existing institutions. The exact form assumed by the "Virtual University" is still in the initial planning stages. The UM System has already created a prototype Virtual University through the UM University Campus.

- **University of Maryland System**

In response to a Board of Regents request for the development of a systemwide investment plan for information technology, the University of Maryland System held a symposium on policy and distance education in March 1997. Recommendations made at the symposium included the establishment of a systemwide planning and budgeting process to respond to the information technology needs of each institution, and allowing for the continued development of compatible systems. It was also recommended that each institution individually develop and plan its own approach to distance learning. The Chancellor created a task force to develop a systemwide plan, *UMS Distance Education: 2002*, which will address funding and other recommendations of the symposium, create an implementation plan for changes to be made to current policies and planning, and devise a system for evaluating progress. The plan is scheduled to be submitted to the Board of Regents in July 1998.

- ***Community Colleges***

The 18 community colleges in Maryland have different networks to operate their distance learning programs. In addition, the community colleges participate with MIDLN and ITV to deliver some of their courses. There has not been any implementation of a cohesive technology distance learning plan for the community colleges of Maryland.

- ***K-12***

Maryland Connected for Learning is a state initiative for connecting all schools to the Internet. Model schools include Logan Elementary School, Hilltop Elementary, and Manor View Elementary. The initiative is in the middle stage of implementing the wiring for all the public schools in Maryland. Maryland Connected for Learning's original plan was to wire 700 public schools, so far it has wired 375 schools. In addition, the initiative has made future plans to expand beyond wiring 700 schools, and to extend the timeline for two more years beyond the year 2001.

- ***E-rate***

Maryland allows its 24 school districts to apply for and manage their own E-rate funds. The state provides support and training for technology coordinators, but is not leading with a plan of action to make use of the E-rate funds.

THE FUNDING SOURCES

In higher education, funding is based on institutional expenditures for services rather than on a statewide funding initiative. This has been cost-effective from the state's point of view, but has also denied the state the policy influence that would come with a statewide funding approach.

Funding for the Maryland Connected for Learning initiative totaled \$7.6 million in 1997, and another \$45 million is slated for the project from 1998-2001. Of the total amount, nine percent will go toward teacher training.

TECHNOLOGY

Several networks independently exist in Maryland. Although the state is not yet actively aggregating these services, aggregation is considered part of its long-range plans. Information dissemination and administrative activity conducted through the Maryland Electronic Capitol have been perceived as highly successful.

■ *University of Maryland System*

Among the 14 institutions of the University System of Maryland (11 are degree granting institutions), the University of Maryland University College (UMUC) has traditionally offered services to adult and part-time students. As such, it has a long history of offering distance education. UMUC offers 13 bachelor's degrees and four master's degree programs entirely through distance learning, using primarily online courses through both general world wide web applications and a UMS-developed proprietary application called TYCHO. Courses are also offered through the IVN, as well as through the ITV system operated by the University of Maryland System.

UMUC also administers the Institute for Distance Education, a resource/consortium serving distance education needs in the state, as well as the International University Consortium, a 50-member consortium started in 1980 offering both courses and professional development worldwide.

■ *Community Colleges*

The community colleges of Maryland are using different technology to deliver their distance learning programs, but they are participating with MIDLN and IVN. MDLIN is a two-way video distance learning system, and IVN is a T-1 infrastructure linking 36 sites, including seven Baltimore community colleges.

■ *K-12*

Maryland Connected for Learning has wired 375 public schools with different networks. Many of the schools are utilizing T-1 and 56kbps backbones to connect to the Internet.

■ *Maryland Interactive Video Distance Learning Network (MIDLN)*

The Maryland Interactive Video Distance Learning Network is a full motion, two-way interactive video distance learning delivery system using fiber optic transmission technology, allowing a maximum of four simultaneous interactive sites. The network originally used three DS-3 lines, but new technology permits a reduction to one DS-3, effectively tripling the capacity of the network. Developed as a public-private partnership with Bell Atlantic, funding has been allocated for 300 classrooms, but only about 110 have been installed to date. The network primarily serves high schools, using community colleges and universities as content providers. Inter-LATA communication restrictions and subsequent high monthly charges have slowed the growth of the network, although recent legislation to subsidize inter-LATA rates allows it to achieve the vision of becoming a truly statewide network.

■ ***University of Maryland System Instructional Television System (ITV)***

The Instructional Television System is the main broadcasting network providing graduate level courses leading to master's degrees in engineering, computer science, and management, as well as serving the teleconferencing needs of the University.

The Instructional Television System uses several forms of transmission, including ITFS, satellite, compressed-video over the IVN, and fiber. Eight analog transmitters around the state allow ITFS transmissions statewide over four channels. Satellite transmissions through Ku-band Telstar 401 transponder 4 are maintained for National Technological University. Satellite transmissions are also possible through Washington International Teleport (WIT). Compressed video is broadcast over the IVN, as well as an ISDN video conferencing system maintained by ITV and the Clark School of Engineering. Fiber is used for data communications within the campuses, as well as the link to the WIT.

■ ***The Sailor Network***

The Sailor Network, a state created information network, provides no-charge dialup access to state government information and basic Internet services for Maryland citizens from home, schools, public libraries, and prisons. The dial-up capabilities are reachable by 90 percent of the population through points of presence (POPs) established in the 23 counties and in Baltimore at public libraries. Frame relay technology is used, and LATA boundaries do not inhibit the service. Schools currently use SAILOR as a primary Internet source. Funding comes through federal allocations to Maryland's Public Libraries.

■ ***Interactive Video Network (IVN)***

The Interactive Video Network is a T-1 infrastructure linking 36 sites around the state: 24 at UMS sites, seven at Baltimore Community Colleges, and five dial up. The compressed video system uses VTEL equipment, transmitting at 384 Kbps.

■ ***Maryland Public Television (MPTV)***

Maryland Public Television provides formal and lifelong educational programs to all the residents. MPTV devotes over 50 hours per week to children's programming. MPTV uses online services, interactive distance learning classrooms, multimedia, video and print to deliver educational materials. In addition, MPTV is in a partnership, called the College of the Air. In this partnership 33 colleges and universities in Maryland, Pennsylvania, Northern Virginia, and Delaware participate to offer more than fifty courses via distance learning enrolling 18,000 students per year.

■ ***Maryland Electronic Capitol (MEC)***

The Maryland Electronic Capitol is used for information dissemination, and for conducting state business over the web. Maryland State Archives, with corporate sponsorship, maintains the system.

■ ***Digital Backbone Network (DBN)***

DBN is the comprehensive administrative network for the state of Maryland, carrying data, voice, and video. Eight hubs are connected via multiple DS-1 backbone lines. Several frame relay applications networks have evolved recently, and the consolidation of these will again reduce telecommunications costs, while offering new technology and services to all state agencies, regardless of size or location. A "virtual" private network for long distance voice service was contracted through AT&T. The independent state networks under the operation of the Division of Telecommunications, DBM, include the Financial Management Information Systems (FMIS), Maryland Distance Learning Network, and Lottery Service Network. The long-range plan is to consolidate all networks into a single state enterprise network, but no timeline has been established.

A fiber optic cable has been installed from DC to Pennsylvania by MCI/TCG, as part of an agreement with the state to use the highway right of way. As part of that project, the University of Maryland System requested and obtained the use of two of the fibers for Internet2 and other test projects. There are plans for creating at least one GigaPOP at UMD, and possibly a second.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Distance learning in Maryland's higher education institutions currently meets more success than projects in K-12 education. Higher education institutions are taking a free market approach, and are independently planning their own distance learning projects, per a 1996 recommendation provided to the Maryland Higher Education Commission by Hezel Associates. It is important to note, however, that these independent activities are taking place against the backdrop of MHEC discussions. Centralized approaches to distance learning in Maryland are bearing little fruit: MIDLN, which at one time promised to serve as a centralized infrastructure for the Department of Education and other state agencies, has fallen far short of original expectations. The inability to provide inexpensive connections to MIDLN has prevented many schools from participating in the network, a short-term setback. More seriously, the backlog has also dampened enthusiasm for educational technologies.

MASSACHUSETTS

ACRONYMS AND NETWORKS

- DOE—Department of Education
- DOE IMS—Department of Education Information Management System
- MCET—Massachusetts Corporation for Educational Telecommunications

EXECUTIVE SUMMARY OF THE STATE

Massachusetts continues to use technology as a key tool in its educational reform efforts. The Department of Education has been working to improve its administrative processes by developing a statewide information management system, which is due to be released in early 1999. State and federal grants have provided much-needed support for technology initiatives that align with the commonwealth's vision for educational technology and reform.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

In 1994, comprehensive planning for educational technology became a reality in Massachusetts with the publication of "*Mass Ed On-Line*," an outgrowth of the Massachusetts Reform Act of 1993. From 1995 to 1996, a five-agency task force was formed to translate the study into a concrete action plan. Resulting from the *Mass Ed On-Line* initiative were local technology plans, Educational Technology Bond matching grants, the Mass Ed On-Line LearNet (MEOL-LN), and the Department of Education's Information Management System (DOE IMS).

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Department of Education (DOE)***

The expanding role of technology in the commonwealth's schools has led to similar growth in the DOE's offices. The DOE's technology cluster has grown from two staff members to a fully staffed technology unit. The ET Advisory Council is the department's primary sounding board for new policies and initiatives. The council's open meeting format allows educators to meet every month and advise the DOE on technology issues.

■ ***Information Technology Division (ITD)***

The Information Technology Division is responsible for setting standards and policies for the use of technology in the Commonwealth. The ITD reports to the Executive Office for Administration and Finance.

■ ***Board of Higher Education***

The Board of Higher Education's mission is to ensure that residents of Massachusetts have the opportunity to benefit from higher education and to establish high standards for education. The board's responsibilities include coordinating programs, activities, and budgets of the three segments of higher education, ensuring accessibility to all residents, and fostering the decision making process.

■ ***Massachusetts Corporation for Educational Telecommunications (MCET)***
MCET was established by the legislature in 1982 as a quasi-public agency to provide telecommunications services to Massachusetts students and educators. MCET's services include daily satellite broadcasts to sites throughout Massachusetts and 22 other states, computer networking for email, videotapes, videodiscs, technical training, and content support.

THE DRIVING FORCE

Activities in K-12 education are fueled by the recommendations outlined in the state's educational technology plan, *Mass Ed On-Line*. Within higher education, the needs and resources of individual institutions are at the basis of technology and telecommunications initiatives.

THE PLANS

■ ***K-12***
The state's educational technology plan, *Mass Ed On-Line*, contains three key goals. First, the plan seeks to enhance student learning and academic achievement and to prepare students for work and citizenship. Second, the plan strives to promote the skills, knowledge, and performance of teachers. The plan's final goal is to improve the efficiency of education management.

To meet the goals of the state's technology plan, the Department of Education (DOE) has initiated five broad activities. First, the DOE has overseen local technology planning. By the end of the 1997 school year, 99 percent of school districts and charter schools had submitted local technology plans to the DOE for approval, and by June 1998, 97 percent of school districts electronically submitted their technology plan update to the DOE. Both of these efforts are tied to state entitlement grants. In order to be eligible for the state $30 per student Educational Technology bond bill grants (1997-98), school districts must have an approved technology plan on file. In order to be eligible to apply for the $15 per student Technology Professional Development grants (1998-99), school districts must electronically update their technology plans.

A second activity the DOE oversees is the development of a comprehensive information management system (DOE IMS). Since 1995, the DOE has been working to administer data more efficiently. In the fall of 1997, the department released a prototype application of its DOE IMS, an on-line school directory that enabled school districts and DOE personnel to share core information on each school, school district, and district administrative staff. The system is expected to be completed by the spring of 1999. Through a web-based system of smart forms, the DOE IMS will allow school districts to enter, edit, retrieve, and transfer data with the DOE.

Third, the DOE administers Lighthouse Projects, an initiative funded through the Technology Literacy Challenge Fund (TLCF). The 53 Lighthouse sites, selected in 1997, include classrooms, schools, and school districts that serve as "beacons" for other districts seeking technology training. The lighthouse sites are required to use one-half of their grant money to disseminate their innovative programs to other school districts through conferences, workshops, site visits, summer institutes, and other technology training and professional development activities. During the 1998-99 school year, the Technology Literacy Challenge Funds will support 70 Lighthouse Technology sites in the commonwealth.

A fourth DOE activity centers on technology professional development. Through state entitlement and TLCF grants, the DOE has provided school districts with resources for technology professional development. As part of its effort to boost technology training and professional development, the DOE has designed and developed a statewide system to coordinate training and development delivery. The resulting system, TTPD-WIRED, is an interactive web site which provides school districts and individual educators with "one-stop shopping" access to a listing of all technology training and professional development courses and providers in the state. In fiscal year 1999, a new technology pre-service grant program will be initiated to support pre-service teachers' technology professional development.

Finally, the DOE is busy making sure that schools are wired. Massachusetts is establishing a statewide intranet, called the Massachusetts Community Network (MCN), which will deliver high-speed, low cost, dedicated Internet access to school districts. The DOE and the state's Information Technology Division (ITD) propose to connect Massachusetts' communities with a statewide, high-speed computer network available to all 3,000 schools, libraries, municipal offices, and National Guard armories. MCN will enable high speed, reliable, point-and-click access from convenient desktop computer to Internet resources, public libraries, and other connected schools. MassEd.Net, the Commonwealth's Internet Service Provider for educators created in 1998, offers unlimited access, E-mail, World Wide Web capability, news groups, other Internet services, and around the clock technical support from JavaNet. MassEd.Net accounts are free until September 30, 1998, after which accounts can be renewed for $25 per year.

■ ***University of Massachusetts Amherst***

The College of Engineering at the University of Massachusetts Amherst with industry partners developed the Video Instructional Program (VIP) as a distance learning facility in 1974. The VIP offers approximately 50 credit courses each semester in addition to a summer session of about 40 courses. Through VIP students may earn master's degrees in engineering management, and master's and doctoral degrees in electrical and computer engineering.

Videotapes are delivered weekly to VIP students all over the country and the world to provide flexibility and convenience in receiving instruction at a time and place that would fit any work schedule. VIP courses are also delivered by KU-band satellite transmission in cooperation with the National Technological University (NTU). This satellite transmission provides a two-way audio bridge that allows interaction between the faculty and off-campus students during live broadcasting. In addition to video and satellite, the VIP offers certain courses via interactive compressed video (ICV).

THE FUNDING SOURCES

■ ***K-12***

Under the Information Technology Bond Bill (Chapter 294 of the Acts of 1996), school districts with approved technology plans have received or shortly will receive Education Technology Bond Bill Matching Grants of $30 per student.

In August 1997, the state legislature approved $15.4 million in new educational technology grants for school districts. All districts with technology plan updates will be eligible to receive up to $15 per student. Superintendents received the grant application in the spring of 1998, and districts had until June 30, 1999 to spend their funds.

Massachusetts received $3.4 million in Technology Literacy Challenge Fund (TLCF) grants in 1997 and $8.1 million in 1998. The TLCF monies support Lighthouse projects and professional development grants for teachers.

The cost of development of the Massachusetts Community Network will be funded by a one-time state appropriation of $13 million. Communities will pay equivalent low-cost service charges (e.g., less than a penny per day per student), even for expensive rural locations. Those charges will fully fund annual operating costs.

Massachusetts K-12 educators benefit from flat rates of $25 per year for toll free, dial-up, Internet accounts in a program administered by the state's Information Technology Division (ITD). This initiative replaced MCET's Mass Ed On-Line LearNet (MEOL) as the state-supported access network in January 1998.

TECHNOLOGY

■ ***K-12***

For several years, Massachusetts has supported the production and distribution of video through the Mass LearnPike, operated by the Massachusetts Corporation for Educational Telecommunications (MCET), and through Massachusetts Educational Television (MET). MCET broadcasts instructional and professional development video through a statewide network of satellite dishes available in over 95 percent of school districts. Massachusetts Educational Television (MET) is a partnership between the Department of Education and the two Massachusetts PBS affiliates, WGBH and WGBY. Through MET, WGBY broadcasts two hours of educational video every weekday.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Massachusetts enjoys a reputation as a leader in technology implementation through the activities of the many institutions of higher education that pepper the state and the state's industrial base. Lost amid the glitz of MIT's Media Lab and Wang, however, is the fact that Massachusetts has never had a lead agency or organization to advocate for statewide telecommunications and technology planning. Until very recently, this has meant no statewide telecommunications system for educators to use. Given the state's size and the number of colleges and universities, the lack of collaboration between K-12 and higher education in Massachusetts is remarkable (although there are signs that the situation might be improving). In adopting a statewide plan for K-12 educational technology and creating initiatives that dovetail with the plan's recommendations, the commonwealth's Department of Education has taken an important step in implementing its vision for statewide technology. If the DOE could gain further support from the higher education community, even more resources could be realized for educators at all levels.

MICHIGAN

ACRONYMS AND NETWORKS

- MDE—Michigan Department of Education
- MICTA—Michigan Collegiate Telecommunications Association
- MIN—Michigan Information Network
- MITC—Michigan Information Technology Commission

EXECUTIVE SUMMARY OF THE STATE

Educational technology takes place in regional consortia, but a statewide planning effort has been embarked as the Michigan's State Technology Plan (1998). This plan includes recommendations such as equal access to technology-delivered learning services, the development of a statewide electronic community, and virtual education network. In January 1998, the Michigan Information Technology Commission (MITC) was established to coordinate and integrate technology and telecommunications planning, funding, and infrastructure statewide. MITC issued a June 1998 preliminary report detailing specific recommendations for action in the areas of technology infrastructure, state policy, electronic and universal access, education, and health care. The Michigan Department of Education is developing a new Michigan Education Information System (MEIS) to enhance communications between the MDE and its constituents. In addition, the MDE has created an inventory of instructional telecommunications systems that tracks new projects in technology and education in Michigan. In higher education, the Michigan Community College Association has recently developed the virtual community college collaborative to address the issue of the underserved community. Traditionally, the universities and colleges of Michigan have separately provided distance learning programs, but there are networks such as the Michigan Information Technology Network (MITN) that deliver engineering degree programs.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Michigan's State Technology Plan: 1998 rests on policies identified in earlier initiatives sponsored by the State Board of Education. The Board first approved a state technology plan in 1987, which was followed three years later by the document, *Education: Where the Next Century Begins.* This 1990 document proposed the creation of a five-year state technology plan, which took place two years later when the State Board of Education produced the *Michigan State Technology Plan (1992-1997)*. The Office of the Michigan Information Network (MIN) was established to address the increasing importance of telecommunications and information technologies. MIN's plan was to connect K-12 schools, community colleges, universities, and libraries with integrated video, voice, and data network.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY.

THE PLANNING GROUPS

■ ***Office of the Michigan Information Network (MIN)***

Within the Department of Management and Budget, the Office of the Michigan Information Network and the Michigan Information Network Advisory Board were created in 1995 by Executive Order 1995-14. The Michigan Information Network (MIN) will link all public schools, community colleges, public and independent higher education institutions, and public libraries. The network will be used for remote arraignments, telemedicine, and distance learning applications. The office will also coordinate access to public information provided via the network. The Michigan Information Network Advisory Board, which oversees MIN's activities, includes members from education, telemedicine, health, and business.

The Department of Management and Budget presented the Fiscal Year 1998 Budget on Information Technology, where it describes the function of Michigan Information Network. The budget reported that the schools are electronically connecting with one another; community colleges and universities are working to develop virtual educational projects; libraries are bridging technological gaps for their communities and hospitals are seeking to provide telemedicine for their patients.

■ ***Michigan Department of Education (MDE)***

Within the Michigan Department of Education, the Educational Technology unit coordinates technology and telecommunications initiatives and collaborates with other state agencies, schools, colleges, universities, and the private sector to develop strategies for implementing the recommendations contained in *Michigan's State Technology Plan: 1998*. The unit also provides expertise and technical support for the Michigan Department of Education curriculum specialists, managers, and State Board of Education members in the identification and promotion of classroom-based strategies that support education reform. Other activities of the unit include representing the MDE in policy level discussions with representatives of the governor's office and others related to the development of the Michigan Information Network, maintaining and supporting MDE's Teleconferencing Center, providing awareness and training sessions on how to access the Internet and compose World Wide Web pages, as well as technical support to the Government Internet Developer's Group.

The State Superintendent's Educational Technology Advisory Group (ETAG) was convened in mid-1997 to assist the Michigan Department of Education in the preparation of a new state technology plan. This statewide advisory group involved approximately 40 groups and organizations representing public and private sector stakeholders in the application of technology in teaching and learning.

■ ***Merit Network***

Merit Network is a nonprofit corporation owned by twelve of Michigan's four-year public universities and charged with promoting computer networking in Michigan. Merit formed in 1966 to interconnect computers at three Michigan universities, and is now the largest Internet service organization in Michigan. Merit provides connectivity to educational institutions, libraries, health care providers, governments, and businesses. MichNet, Merit's IP Backbone network, interconnects the Internet and its shared dial-in services with over 130 sites in Michigan and Washington, D.C. Ninety-five percent of Michigan's residents are within a local call of MichNet and the Internet. Each of Merit's member institutions appoints one representative to serve on Merit's Board of Directors.

■ ***Michigan Information Technology Commission (MITC)***

The Michigan Information Technology Commission is a group of nearly 50 professionals representing business, health care, education and government sectors in the state of Michigan. The Commission was established in January 1998. The W.K. Kellogg Foundation, the Kresge Foundation, the Herbert H. and Grace A. Dow Foundation, and the Council of Michigan Foundations sponsor and lead the MITC. To date, the Commission has developed a set of "action" recommendations for businesses, educators, health care practitioners, government leaders and citizens pertaining to universal access, partnerships and collaboration, advanced networking infrastructure, funding, and implementation activities for information technology.

■ ***Michigan Intercollegiate Telecommunications Association (MICTA)***

MICTA is composed of members from the state's colleges and universities. MICTA identifies and resolves common telecommunications issues and problems; provides a clearing house of information relative to telecommunications; gains information on new telecommunications products and services; improves the level of competency and enhances the professional status of the member college and university administrators; influences the development of telecommunications services to members at reduced costs and improved quality; participates in governmental and regulatory proceedings; and otherwise promotes the common telecommunications interests of its membership.

THE DRIVING FORCE

Local, regional, and institutional needs drive the statewide coordination in educational technology. Michigan is a state where educational technology initiatives take place in regional consortia and through cross-institutional collaboration.

THE PLANS

■ ***K-12***

The most recent statewide educational technology planning effort is *Michigan's State Technology Plan: 1998*. The plan includes 21 recommendations and more than a dozen belief statements in categories ranging from incorporating technology into the curriculum and training teachers and other staff members, to funding educational technology programs and establishing technical standards and a telecommunications infrastructure on which educators can rely. One fundamental recommendation is the creation of statewide policies that address equity of access to technology-delivered learning resources for all students, regardless of their economic status, place of residence, age, disability, and other factors. Another key proposal calls on the Michigan Department of Education and other educational interests to intensify their advocacy of technology in the learning environment. The 1998 plan also calls for the development of a statewide electronic community, a content-based, virtual educational network that incorporates instructional and administrative functions. This electronic community would serve as a single source for the equitable delivery of information, utilization of scarce resources, and resolution of problems common to all educators in the state.

■ *The Michigan Department of Education (MDE)*

The Michigan Department of Education is also occupied with developing a new Michigan Education Information System (MEIS), an Internet-based information reporting strategy. A Goals 2000 grant awarded to the Genesee Intermediate School District and Merit Network, Inc. by MDE in 1996 funds MEIS. The MEIS effort aims to enhance communication between the MDE and its constituents in the collection, analysis, and distribution of education information via the development of a more effective statewide information communication support system for schools. The Merit Network, Michigan State University, and the University of Michigan are working with a group of Intermediate School Districts to identify needs, shape a prototype system, and then evaluate the prototype. A grant from Ameritech increased the number of participating ISD sites from eight to thirteen, funded a specially structured review process, and expanded work on the prototype.

Schools throughout Michigan participate in regional consortia, which receive state funding. One of the most active projects is located in the state's upper peninsula region. The Upper Great Lakes Educational Telecommunications Incorporated (UGLETI) project is a peninsula-wide attempt to develop a telecommunications network for 65 school systems, eight post-secondary institutions, and all regional hospitals. Within the past year, UGLETI had been reorganizing by appointing a new director to continue its goals. Currently, UGLETI is planning to implement an ATM backbone to the Upper Peninsula.

The Michigan Department of Education created an *Inventory of Instructional Telecommunications Systems in Michigan* to include information that focuses on educational telecommunication networks in the state, serving as a reference for educators, government officials, and policy makers. The last updated version of the Inventory was in 1996. However, the Department of Education is planning with the Quality Education Data (QED) to survey the technical needs and assessment of the schools in Michigan this fall.

- ***Higher Education***
- ***Merit Network***

In the fall of 1997, the Merit Board of Directors proposed creating a Merit Advisory Council (MAC) to advance Merit's relationship with its K-12, library, community college, and other affiliate communities. The MAC is to serve as a formal mechanism by which issues and opinions of the affiliates could be presented to the Merit Board. The 15, newly elected members of the Merit Advisory Council first met in June 1998.

- ***Michigan Information Technology Commission (MITC)***

The MITC has made several recommendations to facilitate improved learning, including the development and production of applications to augment education at the K-12 level. Recommendations include additional teacher, administrator, and librarian training in the use of information technology applications. MITC has also recommended that universities, intermediate school districts and education associations develop a technology training component for current educators at all levels.

- ***Michigan Information Technology Network (MITN)***

MITN is the delivery system for graduate engineering and management degrees and programs from the University of Michigan, Michigan State University, Wayne State University, Western Michigan University, Michigan Technological University, and National Technological University. It offered four degree engineering programs in spring 1997, and continues to offer courses and programs via satellite.

- ***Michigan Community College Virtual Learning Collaborative***

The Michigan Community College Virtual Learning Collaborative has replaced the Michigan Community College Telecommunications Network to address issues of students who were underserved in the community colleges. The Michigan Community College Association is creating a virtual learning collaborative among Michigan's 28 community colleges, which will allow students to take courses from any member college. Complete certificate and associates degree programs will be offered at distance via online, ITV, and telecourses. A draft of a strategic and business plan 1998, entitled *Building a Collaborative Network to Support Michigan Community Colleges in a Global Market* outlined the mission, the vision, the goals, and the strategic plans for the future of distance learning in the 28 community colleges of Michigan.

- ***Michigan Information Network***

The Michigan Information Network is a virtual network developed through a collaborative effort of private sector telecommunications companies, the state of Michigan, and users to share voice, video, and data. In creating the coordinated statewide network, MIN will combine demand for telecommunications resources and work with the private sector to design technological solutions. MIN plans a series of initiatives geared at accelerating the adoption rate and use of such a network by emphasizing content, delivery, and user interface.

THE FUNDING SOURCES

■ K-12

Since 1995, the state of Michigan has devoted funds to provide support for educational technology initiatives. More than $10 million of excess earnings of Ameritech were distributed by the Michigan Public Service Commission to two statewide and six regional educational technology programs beginning in 1995. Ameritech matched that figure with a contribution of its own. Through a case settled in 1997 between 84 local and intermediate public school districts and the State of Michigan, the school districts involved received a payment of $212 million; a total investment of more than $600 million was awarded over ten years to non-plaintiff districts. Allowable uses of that latter figure include electronic instructional material and software, technology, infrastructure and infrastructure improvements, and training for technology.

Local monies, too, have gone towards educational technology. In 1996 and 1997, voters in more than 120 local school districts approved "qualified" bond issues under the state's School Bond Loan Fund, which represent building-level, technology infrastructure investments that exceed $190 million.

Michigan schools received $8.2 million in Technology Literacy Challenge Funds (TCLF) in 1997-98, and are due to receive another $18 million in 1998-99.

K-12 schools also obtained funds through non-government sources. A grant from Ameritech in 1996 supported additional work on three key aspects of the statewide MEIS project.

TECHNOLOGY

The numerous distance education consortia in Michigan employ every form of technology to connect the K-12 schools, universities, community colleges, and libraries.

■ MichNet

MichNet, the statewide computer network operated by Merit Network, Inc., provides access from computers and local area networks in Michigan to the worldwide Internet. Merit offers direct, dial-in, and external network connections as well as online and support services. Direct connections to MichNet use leased telephone circuits and are available to four-year colleges and universities, community colleges, K-12 schools, federal, state, and local governments, and both non- and for-profit businesses. Network attachments are available at speeds of 56 Kbps, 128 Kbps, 384 Kbps, 768 Kbps, 1.5 million and 45 million bits per second. Dial-in numbers in 132 Michigan cities, New York City, and Washington, DC allow computers equipped with modems to access the network by making local phone calls. MichNet's 45 Mbps link is provided by InternetMCI.

■ ***Michigan Information Technology Commission (MITC)***

Among the recommendations MITC has developed for enabling technologies is the concept of advanced networking infrastructure to allow data, voice, or video to be transmitted between network connectors. The goal is to deliver new capabilities, including faster and more predictable network services to improve health care, learning, and economic opportunities throughout Michigan.

■ ***Michigan Information Technology Network (MITN)***

The graduate courses and degree programs in engineering are provided to the National Technological University via satellite uplinks. MITN owns 5 satellite uplinks.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Michigan's long-time dedication to grass roots level telecommunications projects shows no sign of waning. In Michigan, regional telecommunications consortia have provided the real fuel for educational technology and telecommunications initiatives for the past decade. The various regional consortia in the state typically include cooperation among local schools, community colleges, and universities, and may also involve health care and telecommunications providers as well. Although there are drawbacks associated with so many fragmented planning efforts, in these settings K-12 schools can potentially reap relatively more benefits. That is, compared to the situation in places where centralized planning from the state department of education may isolate schools from other institutions and organizations, K-12 schools in Michigan can draw upon a broadbased array of resources.

The newly formed Michigan Information Technology Commission is a clear indication that the state's education, business and government sectors wish to coordinate and integrate planning, funding, and infrastructure statewide. MITC brings much needed leadership and vision, and has the potential for moving Michigan towards becoming a national model and leader in creating new applications and utilization of information technologies.

MINNESOTA

ACRONYMS AND NETWORKS

- CFL—Department of Children, Families and Learning
- HESO—Higher Education Services Office
- LNM—Learning Network of Minnesota
- METC—Minnesota Education Telecommunications Council
- MnNET—Statewide data network
- MnSAT—Minnesota Satellite and Technology
- MnSCU—Minnesota State Colleges and Universities
- OT—Office of Technology
- UM—University of Minnesota

EXECUTIVE SUMMARY OF THE STATE

Minnesota has been referred to as a "patchwork quilt" because the state's educational telecommunications and technology projects have had to work within existing structures, rather than creating entirely new organizations. However, this situation may be changing. Governor Carlson formed the Minnesota Office of Technology (OT) in June 1996 to assist the state in setting strategic direction and goals. In July 1997, the Office of Technology was designated as a state agency. The OT is now in the process of developing a master plan for the state's information technology development. The telecommunications-based distance learning also has become more coordinated through recent legislation. For example, the Minnesota Education Telecommunications Council (METC) and the Learning Network of Minnesota (LNM), both products of the state legislature, were responsible for the data connections for all public K-12 schools, higher education institutions, and libraries. Although distance learning efforts within higher education have taken place independently, a cooperatively managed Minnesota Virtual University is underway.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Telecommunications-based distance learning in Minnesota first developed at the grassroots level, and then became a coordinated effort through legislation. The state's community colleges, technical colleges, and universities organized into regional clusters in the late 1980s. At that time, the Higher Education Coordinating Board, which has since disbanded, considered ways to fund their interconnection. The Learning Network of Minnesota (LNM) emerged in 1993 as a postsecondary undertaking to establish connections among the state's six regions. In 1995 LNM's legislation was amended to incorporate K-12 schools and libraries, creating a wealth of connections. LNM's goal for two-way interactive video connectivity in every public postsecondary institution has been accomplished. Statutes which required the clustering of school districts for efficiency resulted in the establishment of what is now eight administrative K-12/library clusters for the network.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Office of Technology***

The Minnesota Office of Technology was formed in June 1996 by Governor Carlson to provide leadership and direction in technology issues for the state. Originally established as a cabinet level agency, it has since been given the mandate to provide statewide leadership and direction for information and communications technology. The office's role with respect to educational technology development focuses on technology's role in supporting lifelong education. The office helps set strategic direction and goals, and helps establish public-private partnerships. With respect to higher education, the Office of Technology acts as a value-added resource for strategic efforts already undertaken by institutions. The office works closely with and relies heavily on the efforts of the Minnesota Education Telecommunications Council.

■ ***Information Policy Council (IPC)***

The Information Policy Council works with the Commissioner of Administration to develop the information management direction for executive branch agencies in the state of Minnesota. Responsibilities for carrying out this mission include the initiation, review, and approval of policy relating to information management. The IPC advises the Commissioner of Administration concerning matters related to the Commissioner's statutory responsibilities of integrating and operating the state's computer facilities, developing plans and programs for information systems, and providing leadership and services in related computer efforts. The Commissioner of Administration in a leadership and oversight role determines the state's overall information technology strategies. To support its mission, IPC helps state agencies identify their information requirements and priorities, then blends the total requirements into a unified overall state direction. The IPC also reviews and approves research and development activities, which are directed toward taking advantage of opportunities in the application of technology.

■ ***Minnesota Education Telecommunications Council (METC)***

The Minnesota Education Telecommunications Council (METC) was created by legislation along with the Learning Network of Minnesota (LNM) in 1993. METC acts as the policy board responsible for the LNM, which is the collective name for the state's educational data and interactive television networks. Through legislation enacted in 1995, METC was charged with establishing data connections to all K-12 and higher education institutions, as well as libraries. METC is also involved with infrastructure, network pathway development, and pilot project operations using various technologies. Although the LNM is a locally driven organization, METC acts as a catalyst to encourage its use and highlight well structured programs.

■ ***Higher Education***

There are two, independently operating state systems of higher education in Minnesota. The University of Minnesota (UM), with its four campuses, is the state's land grant university and a major research institution governed by a 12-member Board of Regents. Minnesota State Colleges and Universities (MnSCU) is a statewide system of 21 community colleges, seven state universities, and 34 technical colleges, governed by a 15-member Board of Trustees appointed by the governor. Both the UM and MnSCU systems have three representatives on the METC.

■ ***Department of Children, Families and Learning (CFL)***

During the 1995 state legislative session, the state Department of Education was abolished and the Department of Children, Learning, and Families was created. The purpose of the new department is to improve the well being of children by coordinating programs, focusing on prevention, enhancing local decision-making, collaboration, and accountability. CFL was phased in over a three-year period to ensure a smooth transition of programs to the new agency. Under the CFL, the Division of Information Technologies provides leadership and management in helping schools, communities, and the department implement information technology. The Division provides support for school technology information and administers grants to schools for technology use in the classroom. The Division also helps schools, teachers, and students gain access to technology for curriculum and instruction. The Instructional Technology Team in the Division supports school use of instructional technology by establishing best practices for teachers and students; facilitating legislative programs and grants; articulating design standards and technology integration outcomes for teaching professional development programs; and establishing a unified technology infrastructure for K-12 education, public libraries, and higher education.

THE DRIVING FORCE

Regional efforts have traditionally led the development of educational technology in Minnesota. Past and current efforts have strengthened that regionalization. For example, the legislation directing the K-12 portion of the Learning Network of Minnesota called for coordination among multiple districts, and operational issues are still handled on a local and regional level. Within higher education, the state legislature has provided much direction for the development and expansion of technology. Recently, Governor Arne H. Carlson has been supportive of efforts to introduce and make use of educational technology, in which the state's emphasis would be on providing the infrastructure, curriculum standards, and staff development.

THE PLANS

■ ***Office of Technology (OT)***

The Minnesota Legislature directed the Office of Technology to develop a master plan for the state's information technology development in 1997. Phase one of the plan, entitled

Beacon to Our Future, was presented to the Senate Ad Hoc Committee on Information Technology in April 1998. Phase one of the plan includes a proposed vision for the state and five goals and their supporting strategies. The document also presents an initial report on the status of information and communications technology in the state, as determined by the Office of Technology. The next phase of the plan's development will involve various structured and facilitated forums to collect input on the plan from public agencies, nonprofit organizations, private companies, business and trade associations, educator, and citizens.

■ ***Learning Network of Minnesota (LNM)***

The Learning Network of Minnesota is in the process of connecting higher education institutions, K-12 schools, and public libraries throughout the state in a single data and video network. LNM's higher education component consists of six regions for dealing with operational and administrative issues. Within the K-12 component, the legislative funding mechanism has encouraged the development of eight administrative school clusters, which do not mirror the higher education regions.

In May 1998, the METC approved a proposal for the higher education regions to analyze the feasibility of implementing Asynchronous Transfer Mode (ATM) services on the Learning Network of Minnesota. The pilot will explore alternative local access technologies, and will also involve the cooperation of the Department of Administration's Inter-Technologies Group.

■ ***Higher Education***

Distance learning has traditionally taken place independently in Minnesota's institutions of higher education. Institutions themselves make decisions regarding programs, degrees, and credit transfers. When coordination occurs, it happens through efforts to make the best use of existing resources, not through mandates. Nonetheless, collaborative discussions are underway to establish a Virtual University in Minnesota, which would combine the resources of the University of Minnesota, Minnesota State Colleges and Universities, and private colleges. In this initiative that stems from the governor's office, three committees are currently meeting to consider student services, quality of learning, and technological infrastructure. The World Wide Web-based university would increase the educational opportunities of students in Minnesota, through institution-based degrees that focus on critical skills shortage areas within the state. The framework for statewide transfer of credits is already in place.

■ ***Minnesota State Colleges and Universities (MnSCU)***

The Minnesota State Colleges and Universities (MnSCU) strategic plan, adopted in December 1996, includes ambitious goals to embrace technology as a core education component, align programs and services with state needs, and strengthen the partnership between MnSCU and K-12 schools. The three-year strategy (1997-2000) focuses on six goals.

MnSCU already has taken strides into technology through its recently established MnSCU Electronic Academy. The Academy, which received $4.5 million in start up funding from the state legislature, will deliver complete academic programs via the statewide interactive television system, and offer multi-media instructional technology, online student services, expanded staff development opportunities, and challenge grants for innovative technology applications.

■ ***University of Minnesota (UM)***

The University of Minnesota (UM) has no formal policies or guidelines for distance learning, nor does it house a higher education coordinating board any longer. Agreements and collaboration among the institutions are now managed by the institutions themselves. UM's decentralized distance learning system operates among its four campuses, with each overseeing its own distance learning courses. At Twin Cities, the largest of the four campuses, about 4,000 students per year participate in approximately 300 distance learning courses. Most of the distance instruction offered by UM is transmitted through the university's ITFS system within the metropolitan areas and the university's interactive television network.

UM has been participating in a joint development project with IBM to create a web-based student registration and services system. The pilot phase was successfully completed in the spring of 1997, and a $7 million to $8 million joint agreement has been signed with IBM to complete the Whistler project by June 1999 for use in the IBM Global Campus Offerings. The project focuses on creating a self-service model for student services, which has considerable implications for service delivery.

THE FUNDING SOURCES

■ ***K-12***

The 1997 legislative session funded a number of educational technology related initiatives for K-12 schools. Schools had access to $14 million in School Technology Site Grants to invest in technology equipment, networks, and training to help change the learning process. An additional $25 million was provided to all districts according to a per pupil funding formula. The legislature also funded a $6 million computer recycling program, a private-public partnership to provide multimedia computers for schools. As part of the Minnesota Learning Academy, the legislature allocated $2 million to offer courses in technology applications for teachers, with an emphasis on the integration of technology into the classroom learning process.

Statewide networks also received support from the 1997 legislature. A $4 million appropriation supported an OnLine Curriculum Library, which was designed to help students, teachers and parents meet Minnesota's graduation standards. An additional $2 million was provided for various technology programs to encourage educational system reform. The Minnesota Learning Network received $12.5 million of additional funds allocated to complete and operate the K-12/Library Learning Network, and an additional $4 million to enhance the post-secondary network, including the development of a high speed GigaPOP gateway at the University of Minnesota.

■ ***Higher Education***

The Virtual University of Minnesota initiative received $1.2 million from the 1997 legislature to develop the common infrastructure for a UM, MnSCU, and private college partnership. The project aims to improve access to higher education for students throughout Minnesota, facilitate the planning and coordination of cooperative programs, and open global markets for the state's many colleges and universities.

MnSCU's Electronic Academy was awarded $33 million from the 1997 legislature for equipment and software, faculty training, design and delivery of programs through distance learning, and an additional $15 million for development of a common student information system.

As part of the UM's Technology Initiatives, the university received $53.7 million from the state legislature for various initiatives, including connectivity infrastructure, equipment, PC's for students, faculty development, and technology integration into instructional design, and delivery.

TECHNOLOGY

■ ***Learning Network of Minnesota***

LNM is a statewide education and government two-way interactive voice/video/data land-based communications network consisting of fiber optic, coaxial cable, and copper wire networks that are based on analog, compressed, and wideband digital presentation technologies. For K-12 schools and libraries, a maximum of a T-1 drop is provided to each school district and regional area, and school districts assume responsibility for interconnecting district buildings and constructing a LAN. Many schools already had a compressed video connection in their districts, in which case the state provided a data drop. In the cases where no connections were present, the state provided both the data and video drops.

■ ***Minnesota Satellite & Technology (MnSAT)***

MnSAT serves clients with Ku-Band, C-Band, and Digital-Based satellite broadcasting capability. Its broadcast efforts are enhanced with two-way communications through fax, telephone, and Internet technologies for asynchronous and synchronous communication. MnSAT facilitates remote-site broadcast activities, utilizing a mobile uplink antenna or mobile microwave link to the fixed antenna field at the remote site. MnSAT relies on land-based fiber optic technology linking several St. Paul government buildings and interfaces with LNM. MnSAT also interfaces with commercial land-based, two-way interactive voice/video/data networks within the state of Minnesota, as well as via national carriers.

■ ***University of Minnesota (UM)***

The University of Minnesota relies on leased landlines to connect its campuses. Via T-1 lines, compressed video courses are transmitted at 768 Kbps. UM's interstate compressed video is transmitted at ¼ T-1 on ISDN lines. The University of Minnesota's ITV system is interconnected with the state's LMN. The UM also maintains an ITFS system in the metropolitan area that serves the business community.

■ ***UNITE***

UNITE is housed within the Institute of Technology on the Minneapolis Campus of the University of Minnesota. Broadcasting occurs from six UNITE classrooms, each equipped with cameras and microphones for recording instructors and on-campus students for interaction. Programming is broadcast live over four ITFS microwaves channels, with talkback from off-campus sites to the on-campus classroom provided by the dedicated FM link or telephone lines.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Coordinating statewide educational telecommunications and technology is challenging in a state such as Minnesota, where so many important projects and decisions historically have been initiated at the grass roots level. From a statewide perspective, the Minnesota Office of Technology is in a unique position to integrate networking efforts for more effective government and education. Yet the two year old Office of Technology is the newcomer to a setting in which the Minnesota Education Telecommunications Council (METC) has existed since 1993. Moreover, a number of the Office of Technology's tasks parallel those of regional initiatives and METC. Taken together, these conditions create difficulties for the Office of Technology's ability to introduce and carry out its own plans. Given Minnesota's background, the question of whether technology planning can be coordinated among K-12, higher education, and the state is still an open issue.

MISSISSIPPI

ACRONYMS AND NETWORKS

- CET—Council for Educational Technology
- IHL—Institutions of Higher Learning
- ITS—Department of Information Technology Services
- MDE—Mississippi Department of Education
- MET —Mississippi Educational Television (aka METV, MAET–Miss Authority for Educational Television)
- MIVN—Mississippi Interactive Video Network

EXECUTIVE SUMMARY OF THE STATE

Mississippi has undertaken a comprehensive approach to using and applying educational technology and telecommunications. Much of this activity relates to the cooperation and coordination that has been institutionalized by the state's key organizations. Now the state's various video networks are operated out of a central switching and scheduling center in Jackson. The results achieved can be seen in the development of the backbone data and video networks, and the statewide contract for the library database system.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

In 1994, the legislative interest in the development of educational technology took shape with the passage of Senate Bill 3350, the Education Technology Enhancement Act. This bill created the Council for Educational Technology (CET) as an advisory group for the development of educational technology. The Department of Information Technology Services (ITS) has been developing annual reports, strategic plans, and infrastructure plans to assist the state in planning and developing initiatives for the future. The Mississippi Authority for Educational Television has been contributing to the state's technology plans by offering courses via ETV broadcast, EDNet, and MS ETV Interactive Video Network (METIVN).

Independent networks for distance education have evolved into a statewide compatible system. EdNet has managed two such efforts. In early 1990, Ednet was developed as a nonprofit corporation consisting of a public/private partnership that manages and programs Mississippi's Instructional Television Fixed Services (ITFS) channels reserved for distance learning purposes. Also in early 1990, Fibernet 2000 was activated as an analog, full motion interactive video system in several districts and universities in the state. This public-private partnership network, reaching some 20 sites, was converted to T-1 compressed video in 1994. A STAR Schools grant enabled Mississippi ETV to expand this compressed video network for K-12 education to over 100 sites by the fall of 1997. Although federal funding for this program has ended, Mississippi ETV will continue to manage this network as METIVN. The Community College Network (CCN), originally implemented in 1994 and funded by a federal Rural Health Corps grant to better educate Mississippi's health care professionals, introduced Mississippi to the statewide compressed video network concept.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Council for Educational Technology (CET)***

The Council for Educational Technology (CET) was created in 1994 to serve as an advisory group for the Mississippi Department of Education's (MDE) educational technology development, planning, and implementation activities. The CET is composed of members from the MDE, Institutions of Higher Learning, State Board for Community and Junior Colleges, Mississippi Educational Television, Mississippi Library Commission, Department of Information Technology Services, and private industry and business members. The CET is responsible for setting state standards and advising, and is heavily involved in planning and funding recommendations to the legislature. Also charged with the continued development of the *Mississippi State Plan for Educational Technology*, the CET has established a framework for interconnectivity of resources. The CET advises the Department of Information Technology Services on matters relating to the administration of the statewide data and compressed video networks, and recently obtained a statewide contract for library database services. Under legislative direction and the guided intent of its members, the CET has become the focal point of technology planning efforts for education in Mississippi.

■ ***Department of Information Technology Services (ITS)***

ITS is responsible for providing technology planning leadership among the state's agencies and the governor's office. Services such as the Information Systems Services, Education Services, Data Services, Voice Services, and Strategic Services that involve providing information, procurement, planning, support, implementation, and training of technology are all offered by ITS.

ITS drafts annual reports, infrastructure plans, and strategic master plans on behalf of the state. The *ITS Strategic Master Plan for the Fiscal Year 1998-2000* defines the state's strategies and goals, as well as describes the state's current technology and future technology trends. The ITS Annual Report for the Fiscal Year 1998 outlines to the governor and legislature the agency's activities during the previous year. The ITS Infrastructure Plan for 1998 represents the current view of the state's strategies for embracing new and evolving technology.

■ ***Institutions of Higher Learning (IHL)***

The 12-member Board of Trustees is the constitutional governing body of the state institutions of higher learning. The Board is responsible for policy and financial oversight of the eight public institutions of higher learning. Although each institution independently pursues its own distance learning program and purchases its own equipment, the IHL has centralized some of the policies, administration, and information to foster the collaborative development of programs. The IHL also oversees the compressed video network connecting higher education institutions. Coordination of scheduling, as well as network planning and implementation, is done centrally through the IHL.

IHL's policy dictates the conditions to be met in order to offer degree programs via distance learning, as with any other degree program. Any institution initiating a degree program must make other campuses aware of its intentions, and offer the opportunity to collaborate. The offering of distance learning courses is not subject to this requirement. The IHL universities offer a number of courses through the Southern Regional Education Board's (SREB) Southern Regional Electronic Campus (SREC), and the State Board for Community and Junior Colleges (SBCJC).

■ ***State Board for Community and Junior Colleges (SBCJC)***

The Mississippi State Board for Community and Junior Colleges is a coordinating board and agency which establishes standards and guidelines for the operation of the 15 local community college districts in order to qualify for state appropriations. The State Board consists of ten members – two from each of Mississippi's five congressional districts – and the SBCJC agency staff consists of approximately 30 individuals.

The SBCJC is a service agency, committed to improving the status of others through problem-solving, innovation, and capacity building. The mission of the SBCJC is to enhance the education and training of all Mississippians, promote positive leadership, and create partnerships with business, industry, and other entities. The SBCJC's assignment is to create and translate vision, while providing products and services within the boundaries of the law that have a positive impact on education and training in the state of Mississippi.

■ ***Mississippi Educational Television***

The Mississippi Authority for Educational Television is a state agency, governed by a seven-member board and responsible for the administration, operation, control, and supervision of educational television and radio in Mississippi. The mission of MAET is to enrich the lives of Mississippians through the creative use of technologies to deliver programs and services that educate, inform, entertain, and inspire.

THE DRIVING FORCE

The creation of the Community College Network (CCN) and the Fibernet 2000 project raised the state's awareness of the possibilities technology and telecommunications offer to education. The increased collaboration and cooperation resulting from the activities of the Institutions of Higher Learning Board and the Council for Educational Technology have further stimulated broad-based support for investing in educational technology.

THE PLANS

■ Department of Information Technology Services (ITS)

ITS was given the responsibility for developing a planning document for the state's infrastructure and technology. Its 1998 report, the *Mississippi Statewide Information Technology Infrastructure Plan*, identifies three very broad strategic objectives for the state to pursue. The plan's first strategy is to inform the governor's office, legislature, agency and institutional directors, and other interested parties about the statewide infrastructure's components and the activities required for building and maintaining that infrastructure. Second, the plan will serve as a guideline to ITS, business partners, and agency and institutional technical staff. The plan will also serve as the basis for infrastructure planning activities for the next fiscal year. The plan describes current methods of funding for infrastructure and issues surrounding those methods. It also stresses the importance of continuing infrastructure funding for the entire state. ITS will continue to work with agencies, institutions, and the legislature to ensure continuity and adequacy of infrastructure funding. The plan also includes detailed descriptions of the eleven major components of the infrastructure plan, together with the projects planned for each of those components.

■ Mississippi Department of Education (MDE)

MDE's technology activities follow the strategies outlined in the *Mississippi Master Plan for Educational Technology*, first published in 1995 and updated biannually. Included in the report are standards that lay the groundwork for successful integration of the various distance learning networks in the state. The original Master Plan asked that each school develop a technology plan and gave the Council for Educational Technology (CET) responsibility for allocating the original $30 million appropriated through Senate Bill 3350. June 1997 was the submission date for schools' technology plans. All Mississippi school districts have approved technology plans that are in the process of being implemented.

The MDE has taken an active, centralized approach to bring teacher training for technology into each of the schools. The MDE oversees a three-phase training for teachers, and has developed a new 10-day executive management institute on technology for administrators. Five service centers at universities are delivering some of the training. Approximately 8,000 teachers have been trained. An Exemplary Teacher Program, a three-year program designed to develop teacher capacity in technology in every school in the state, began in 1998 with one teacher from each of the 30 network regions, who will act as trainers in their respective regions. In 1999, the program will expand to include one teacher in each district, and the following years until there is one teacher in each school prepared to mentor, model, and motivate other teachers regarding technology integration into the curriculum.

■ E-rate

The MDE Office of Educational Technology serves as the coordinating group for E-rate activities in the state. A state application has been filed for the backbone. School districts are being trained through the Office of Educational Technology, which sponsors weekly videoconferences to field questions.

- ***Higher Education***

All Mississippi public universities will expand their distance learning offerings. A joint distance education program, sponsored by Mississippi State University, the University of Mississippi, the University of Southern Mississippi, and Jackson State University since 1997, offers a master's degree in Systems Management. The degree is designed for mid-career, information systems professionals, and follows a single cohort model. Students can select to attend any of the four institutions as the degree-granting institution. Jackson State University and Mississippi State University are offering another cooperative degree program in Vocational Rehabilitation Counseling.

- ***University of Mississippi***

Interactive video has been used at Ole Miss for several years, while satellite based delivery within its own campuses and for a handful of programs to high schools has taken place over the past eight to 10 years. Ole Miss operates three interactive video sites: one at the main campus in Oxford, and two at remote sites in South Haven and Tupelo. Approximately ten courses are delivered each semester for credit, in addition to several non-credit courses and seminars.

- ***Mississippi State University***

Mississippi State University does not maintain a network of its own, and therefore relies on other institutions' resources. The university relies on satellite, videotape, Internet, and the state's interactive video network to deliver courses, and offers 10 courses per semester via the IVN and two or three others over the Internet. Mississippi State offers graduate courses leading to Master's of Science degrees in Instructional Technology and Counselor Education, as well as certification and other graduate courses in various disciplines. Mississippi State also produces professional development sessions and other workshops for SREC. The university's College of Engineering manages its own distance learning graduate program in engineering. The three- to four-year program reaches between 60 and 100 students per year nationwide, primarily through videotape, but also through interactive video when corporate finances are committed.

- ***University of Southern Mississippi (USM)***

USM has six interactive video classrooms: two classrooms on the main campus, two on the major branch campus, one at the Stennis Space Center, and one at a community college, with another site to be added by July 1998. Approximately 30 courses each semester reach 1,000 students. Most of the courses offered are distributed within the university only, although three to four courses each semester are offered over the statewide network.

■ ***Mississippi Educational Television (ETV)***

Mississippi ETV, along with the Department of Education, Institutions of Higher Learning, and the State Board for Community and Junior Colleges, are cooperatively planning EdNet, a nonprofit corporation that administers and programs Mississippi's Instructional Television Fixed Service (ITFS) channels reserved for distance learning uses. When completed in late 1999, EdNet will be an interactive statewide network of five instructional TV channels. EdNet now broadcasts on one channel in Jackson and the surrounding counties. Within the next year, EdNet will be able to provide interactive instructional programs to those Mississippi schools that have Wireless One, a wireless cable company to which EdNet leases unused channels. To date, the transmission infrastructure has been installed in the Jackson cell. As part of the project, 1,100 ITFS receivers will be installed in sites throughout the state, primarily in schools.

In addition, Mississippi ETV and the Mississippi Department of Education continue partnering in the expansion and growth of METIVN to approximately 120 sites. Current enrollment is approximately 2500 students, and projected to reach 4000 by the year 2000. Over 135 courses, as well as special events and staff development programs, are currently available. The number of courses is projected to increase to 150.

■ ***State Board for Community and Junior Colleges (SBCJC)***

The SBCJC and the state's public community and junior colleges are entering the third year of a three year comprehensive plan to interconnect their colleges, campuses, and their overall system. While the SBCJC continues to coordinate and operate a statewide data and compressed video networking system, the colleges and SBCJC are embarking on a new effort to expand and enhance their distance learning offerings. This expansion will be accomplished through the establishment of a virtual community college, whereby the colleges will develop and offer programming, which is coordinated through the state office.

THE FUNDING SOURCES

■ ***K-12***

In 1997, the Mississippi Department of Education (MDE) received a Technology Grant under the Technology Literacy Challenge Fund to assist local school districts in implementing their local technology plans and achieving the President's four goals for educational technology. The $3.5 million challenge grant award was shared by 20 school districts. The second year of the program provided an additional $6.6 million in grants for 41 school districts. The grants, which ranged from $95,000 to $200,000 were focused on low-wealth, low-technology elementary schools with innovative plans for achieving their goals.

■ ***Mississippi Educational Television***

In 1996, the Mississippi Authority for Educational Television and the Mississippi Department of Education were awarded a Star Schools Grant for $8 million by the U.S. Department of Education. The grant supported a two-year project to extend the Fibernet network to all 82 counties. The grant carried a 50 percent matching requirement, which was provided by local school districts, the Mississippi Department of Education, ETV, and Bell South.

■ ***SBCJC***

The Mississippi legislature obligated $29 million in telecommunications bonds to the community and junior colleges. State bonds, along with local, federal and state appropriations, have made the interconnection among the colleges and state offices a reality.

TECHNOLOGY

■ ***Mississippi Interactive Video Network (MIVN)***

MIVN is a collaboration of three independently managed, interactive video networks: METIVN, the Community College Network (CCN), and the University System network. METIVN, the Mississippi Educational Television Interactive Video Network, serves approximately 100 K-12 schools and includes the FiberNet2000 network and the more recent STAR schools network. The Community College Network is composed of 25 compressed video sites located at Mississippi's 15 community colleges and numerous branches. The SBCJC is responsible for the overall management of the CCN, CCN Network scheduling, and CCN equipment maintenance. The University System network includes 22 sites, which are managed cooperatively by the Institutions for Higher Learning (IHL), with control and investment in sites retained by the individual institutions. In total, the MIVN includes 137 sites. Although MIVN exists as one physical network, management and scheduling is handled through three distinct divisions: K-12 (ETV), Community Colleges (CCN), and universities (IHL). The Council for Educational Technology advises the MIVN, while Mississippi Educational Television has served as the hub site since 1997.

Through these combined networks, almost anyone in the state now lives within a 20-minute drive of a site. Multipoint fully interactive conferencing is theoretically possible for any number of interconnected sites, although realistically the maximum number is 20-25 sites connected using audio switching.

■ ***Community College Network (CCN)***

The Community College Network (CCN) is a compressed video system of 25 sites that are connected through a T-1 network at 768 KBPS. CCN is a private network originally funded through a Rural Health Corps grant from the US Department of Agriculture. Most of the courses offered over the CCN are internal to the community colleges, although there is some collaboration with four-year institutions on post-graduate studies and graduate nursing programs. The mission of the CCN is to make specialized instruction available on all community college campuses, to make advanced degree courses available on all community college campuses, and to permit the introduction of new telemedicine technologies.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Mississippi's current plans to implement EdNet demonstrates the evolution of educational telecommunications networks over the course of a decade from independent entities into more coordinated initiatives. Fibernet 2000's analog video system of 1990 matured into a T-1 compressed video network in 1994. Mississippi Educational Television extended Fibernet 2000 in 1996 through Star Schools funding, creating the Mississippi Educational Television Interactive Video Network. This network, in turn, complemented the two statewide telecommunications networks then in use by postsecondary institutions—the Community College Network and University System network. With EdNet's emergence, the state's institutions of higher education, K-12 schools, and public television authority have created a cooperative forum for furthering distance learning opportunities for students of all ages in Mississippi.

MISSOURI

ACRONYMS AND NETWORKS

- CBHE—Coordinating Board for Higher Education
- DESE—Department of Elementary and Secondary Education
- DP&T—Division of Data Processing and Telecommunications
- MOREnet—Missouri Research and Education Network
- OIT—Office of Information Technology
- TCRC—Telecommunications Community Resource Center

EXECUTIVE SUMMARY OF THE STATE

The Governor established the Office of Information Technology (OIT) in 1995 to implement an ongoing strategic information technology planning process to address statewide acquisition, implementation and application of information technology. Educational departments and councils coordinate initiatives to improve technology planning, from elementary schools to universities and colleges. The Department of Elementary and Secondary Education (DESE) collaborates and creates projects for effective use of technology for K-12 schools. The Coordinating Board of Higher Education (CBHE) assesses the current technology and makes recommendations of future technology trends for improvements in delivering quality education for colleges and universities. Although each of the four institutions of the University of Missouri System historically has operated independently, they have begun to cooperate with the other institutions in technology planning.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

To understand the current programs that provide generous funds for the state's K-12 technology initiatives, it is necessary to go back to 1993, when Missouri enacted educational reform legislation known as the Outstanding Schools Act (OSA). The OSA increased Missouri's financial investment in education by more than $360 million per year, and began a series of reforms designed to move Missouri's schools into a model system of educational excellence. Issues of educational funding equity and adequacy were fundamental to the reform effort, and the idea emerged to use instructional technologies as one means to distribute educational materials and provide opportunities for professional development more equitably. The state made subsequent efforts to study the role of technology in greater detail. In 1995 and 1996 the Missouri State Board of Education adopted technology plans that more specifically detailed how technology can be used to promote educational equity, educational enhancement, workforce preparation, and state and local economic health.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Division of Data Processing and Telecommunications (DP&T)***

The Division of Data Processing and Telecommunications is the central point for coordinating the data-processing policies of the executive branch. The division promotes economy and efficiency in the use of data processing and telecommunications for the transaction of state business. The division operates a centralized computer facility used by state agencies and elected officials, maintains a data processing education center for state employees, offers systems development services, operates the state telephone switchboard and associated state telecommunications network, and offers data entry services to the Office of Administration and elected officials.

■ ***Office of Information Technology (OIT)***

The Office of Information Technology was established in 1995 as a result of Governor Carnahan's Commission on Management and Productivity. One of the six task forces of the commission was the Automation Task Force, which had a mission to develop strategies to improve existing information technology, and create a plan to establish an infrastructure, which supports innovative management solutions. The Office of Information Technology's priorities are implementing an ongoing strategic information technology planning process which addresses statewide acquisition, implementation, and application of information technology; integrating state government mainframe computing resources; and consolidating the state telecommunication networks to improve management planning, operation, and expansion of available functions.

■ ***Department of Elementary and Secondary Education (DESE)***

The DESE's Special State Instructional Programs office assumes the responsibility for administering several state-funded technology grant programs that assist districts to improve schools, expand local curriculum, and improve classroom teaching practices; and hosts an annual statewide educational technology conference. Two of the critical issues identified in the Department of Elementary and Secondary Education's 1995 mission statement focus on technology: the effective use of technology by all students for personal, academic, and occupational purposes; and department technology planning, implementation, and training.

■ ***Coordinating Board for Higher Education (CBHE)***

The Coordinating Board is the head of the Missouri Department of Higher Education. Its nine members are appointed from each congressional district by the governor and confirmed by the senate. The Missouri Coordinating Board for Higher Education's major statewide planning and coordination goals are to promote academic quality, to ensure the efficient use of resources, and to provide financial access to the 26 public institutions in the state's system of higher education. The Board includes the state's independent institutions as well as the public institutions in its planning activities. The CBHE's technology planning is guided by its vision for a telecommunications-based delivery system.

■ ***University of Missouri System***

Each of the four institutions of the University of Missouri has traditionally operated independently. Recently, however, the four institutions have begun to cooperate on both administrative and programmatic levels. The University of Missouri-Kansas City has been especially proactive in its technology planning through the efforts of its Information Technology Executive Council (ITEC).

■ ***MOREnet***

MOREnet is a consortium of higher education institutions, schools, community groups, and other organizations that provides collaborative networked information services to its members and customers in support of education, research, public service, economic development, and government. MOREnet's members sustain the consortium through their contributions in terms of leadership, staff participation, and financial support.

THE DRIVING FORCE

The Coordinating Board of Higher Education (CBHE) has continued the movement of Missouri's education into the 21st century by planning for technology improvements for the public colleges and universities. The Department of Elementary and Secondary Education (DESE) has been making recommendations, and collaborating for a statewide technology plan for the K-12 schools.

THE PLANS

■ ***K-12***

Missouri has been busy implementing the recommendations made in its statewide educational technology plans, The *Show-Me Technology Plan: Mapping a Brighter Future, and the Taking Missouri Schools into the 21st Century* plan, adopted in 1996 and 1997 respectively. The Show-Me Technology Plan identified the current status of technology in Missouri and provided policy makers and school districts with a blueprint to guide state and local technology planning, implementation, and evaluation. The *Taking Missouri Schools into the 21st Century* plan identified priority areas for schools' continued technology use.

The Missouri Department of Elementary and Secondary Education (DESE) has participated in several collaborative technology projects. The DESE Technology Network Project provides Internet access to public school districts through connections to MOREnet. Initiated in 1994, the project's overall goal was to provide a single 56 kbps dedicated data connection to all 525 public school districts in the state. During its pilot year, the project provided dial-up access through toll-free modem pools. In 1995, the project expanded to connect 105 school districts to the Internet with a 56 kbps dedicated data connection. The number of schools increased to 255 in 1996, and 480 in 1997. The DESE Technology Network Project currently provides Internet access to over 90 percent of the school districts in the state, and is beginning to offer T-1 dedicated data connections to qualifying school districts.

■ *E-rate*

The Department of Elementary and Secondary Education (DESE), along with the Missouri Coalition of 21st Century Schools, is supporting school districts' E-rate application efforts. DESE also provided testimony in favor of the E-rate to the Missouri Public Service Commission.

■ *Coordinating Board for Higher Education (CBHE)*

In June 1996, recommendations for a telecommunications-based delivery system were presented to the CBHE. That planning initiative recommended a three-year approach to expand the existing infrastructure and programs, and create a coordinated distance learning program with common goals. The CBHE appointed Telecommunications Advisory Group (TAG) in October 1996 to identify subsequent steps for the continued implementation of Missouri's Telecommunications-Based Delivery System. TAG's June, 1997 report focused on partnerships and collaboration among the institutions of higher education. Regional planning efforts in the state contribute to greater coordination. For example, northwest and southwest Regional Educational Consortia and Regional Technical Education Councils are performing regional needs assessments and conducting joint long-range planning for program development and delivery. To further enhance cooperation, the CBHE is compiling an electronic catalog of all distance learning courses offered through the public institutions in the state.

■ *University of Missouri*

The University of Missouri system is actively involved in distance learning and relies on its interactive video network. The system offers 48 courses through distance learning technologies, most of which are delivered via interactive television. Within the university system, the University of Missouri-Kansas City (UMKC) is at the forefront of efforts to consolidate technology planning. The Information Technology Executive Council (ITEC) at UMKC has been working to integrate and coordinate all of the separate information technology goals from across the four divisions of its campus; in June 1998, it released a Strategic Plan for Information Technology. In the plan, the ITEC described its vision and mission for information technology. The strategic plan also addressed issues involving UMKC's organization, infrastructure, support services, and personnel. Among the goals the ITEC identifies is the development of a centralized organization to administer information technology at UMKC. As a result a position of Vice Chancellor for Information Technology was created to develop an information technology infrastructure to support UMKC's distance learning opportunities.

■ ***Central Missouri State University***

In 1997, the Coordinating Board for Higher Education designated Central Missouri State University as the state's lead institution for academic and professional technology. The academic technology designation covers the area of enhancement of education through technology, while the professional technology designation promotes the further development of highly sophisticated degrees, which have a technical component to them. As part of the academic technology designation, CMSU is creating an infrastructure to accommodate electronic delivery of instruction with a broader perspective that builds on its existing distance learning program. CMSU currently offers two full master's degree programs in industrial safety management and criminal justice via distance learning, as well as a large proportion of the course work leading to a master's degree in education. CMSU delivers dual credit courses to high schools. In the spring of 1998, CMSU began offering three World Wide Web-based courses to complement its interactive video instruction.

■ ***Community Colleges***

As a result of legislation passed in 1996, the state's 12 community colleges now have incentives to provide instruction into the farther-reaching service areas outside of their taxation districts. In particular, the legislation focused on increasing community colleges' ability to provide economic development opportunities through the state's vocational-technical schools. As part of this initiative, the community colleges are requesting that $14 million of a $25 million budget be allocated to connect the community colleges to the state's vocational-technical colleges. The funds would provide a basis for a community college distance education infrastructure.

THE FUNDING SOURCES

■ ***K-12***

Missouri schools receive a variety of grants through the Department of Elementary and Secondary Education (DESE). The Video Instructional Development and Educational Opportunity (VIDEO) program was created by the General Assembly in 1988. A dedicated tax on video and video equipment rentals in the state provides funds that are distributed to local education agencies, institutions of higher education, and public broadcast stations for the purpose of supplementing educational opportunities via telecommunications technology. The VIDEO provides more than $3 million in funds every year for telecommunications technology for schools. VIDEO program funds also support the state's involvement in the TEAMS Distance Learning program. A 29-member VIDEO Advisory Committee oversees the program.

The Outstanding Schools Act of 1993 created the Technology Grant Program, which provides funds to school districts for the acquisition of hardware and software, and access to the worldwide network of computing and information resources. The program provides $5 million each year, and the funds are made available through entitlement and competitive grants to school districts. Three types of grants are available to schools under the Technology Grant Program. First, Technology Acquisition Grants provide $2,000 per school district plus a per-pupil allowance, and require a dollar-for-dollar district match. An additional $8 million for technology expenditures is available requiring a 20 percent district match. Second, Competitive Technology Grants provide between $10,000 and $50,000 to school districts. A district must provide matching funds of 10 to 30 percent, based on relative student wealth. Proposed projects should focus on the use of computer networking to improve instruction at the kindergarten through ninth grade levels, but may also address secondary applications. Finally, Missouri offers two categories of Two-Way, Interactive (ITV) Grants. Implementation grants of up to $50,000 support school districts' technology purchases, while enhancement grants of $5,000 are for districts which already offer for credit courses via interactive television. A 10 to 30 percent district match is required for the ITV grants. The Missouri General Assembly supplemented the Technology Grant Program with one-time funds totaling over $20 million in 1995-96 and 1996-97 school years. For the 1997-98 school year an additional $120 million supplemented the program.

With regard to federal monies, Missouri received $3.08 million in Technology Literacy Challenge Funds in fiscal year 1997, and $6.65 million in fiscal year 1998. The state used the grants to help schools fulfill their local technology and comprehensive school improvement plans.

■ *Higher Education*

The Governor's fiscal year 1997 higher education budget totals $838.6 million, which includes accountability, new vocational/technical initiatives, and support for college and university operation. The Governor has recommended $61.8 million in higher education capital improvements that include the maintenance of the facilities and equipment to deliver quality education that would meet the needs of the 21st century. The Governor has also recommended a one-time funding of $14.7 million for continuing improvement in library technology and information for the public colleges and universities. The improvements are an effort to link academic libraries and provide funds for faculty, staff, and student training.

TECHNOLOGY

■ *Division of Data Processing and Telecommunications (DP&T)*

In 1995, DP&T established videoconference sites in Jefferson City, Kansas City, and St. Louis for use by all state governmental agencies. Requests for the new service and additional locations prompted DP&T to connect the state's three sites with nine university-based video sites in 1996, establishing a statewide videoconference network, the Integrated Voice and Data Network (IVDN).

Educators in the state may benefit from a fiber optic network extending along the state highways overseen by the Department of Transportation. The Department of Transportation has issues and RFP for statewide ATM services over this OC-3 backbone.

■ ***K-12***

Through the DESE Technology Network Program, schools have two levels of connectivity to the Internet: 56kb and T1 (1,536kb) dedicated data connections. By the end of the 1998-99 school year, the DESE intends for each school district in Missouri to have sufficient Internet connectivity bandwidth, up to a T-1 dedicated data connection, to support instructional and administrative activities within the school district. DESE will use Internet access for regular electronic communication and data collection.

■ ***MOREnet***

MOREnet operates an integrated TCP/IP network that provides Internet access in Missouri at speeds ranging from 56 Kbps to 10 Mbps. Network support services provide members with dedicated telecommunications lines and other associated communications hardware and software. MOREnet also provides training, reference and help desk support, research and development, and database and fee-based services.

■ ***University of Missouri***

The University of Missouri system maintains a statewide T-1 compressed video network connecting its four campuses. Additional T-1 connections are located at eight Telecommunications Community Resource Centers. The 786 Kbps compressed video network is linked through bridges to other regional video networks.

■ ***Central Missouri State University***

CMSU contains two distance learning classrooms and has plans to add two more with the construction of a new library. CMSU delivers its distance learning courses via T-1 lines using compressed video. CMSU shares its instructional programming with two regional consortia, WeMET and KC-Ednet.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

As is the case for many other states, one of Missouri's key strengths is also proving to be a considerable drawback for the development of its educational telecommunications and technology resources. Regional consortia have emerged throughout the state, and have offered valuable tools and information to teachers at all levels of education. Consortia that include a mixture of K-12 schools and postsecondary institutions have exerted particular impact. For example, the Western Missouri Education Technology Consortium (WeMET) includes 13 school districts and Central Missouri State University, while the University of Missouri-Kansas City participates with seven other higher education institutions and community colleges in KC-Ednet. Although these consortia allow courses to be distributed to almost every part of the state, they rely on a mixture of locally available technologies. Because not all regional networks are interoperable, the possibility of an eventual statewide system is called into question and remains a concern to state planners.

MONTANA

ACRONYMS AND NETWORKS

- ISD—Information Services Division
- ITAC—Information Technology Advisory Council
- ITMG—Information Technology Managers' Group
- METNET—Montana Educational Telecommunications NETwork
- PSC—Public Service Commission
- SEC —SummitNet Executive Council
- SummitNET—State and Universities of Montana Multi-protocol NETwork

EXECUTIVE SUMMARY OF THE STATE

The state of Montana is in the process of examining its telecommunications infrastructure and the use of its multiple networks, including SummitNet, METNET I and the METNET BBS. A request for proposals has been issued to provide the state with guidance concerning how best to merge the three networks and where to allocate additional funds for network and infrastructure development.

The Governor's Blue Ribbon Telecommunications Task Force examined the federal Telecommunications Act of 1996 and developed a parallel program for the state. Based on the Task Force's recommendations, the state adopted its own E-rate plan and allocated $250,000 to the program in 1998 and $500,000 in 1999. Schools will not be able to receive both state and federal Universal Service Funds. The Montana Public Service Commission will administer the funds.

Three years remain in the National Science Foundation Grant that provided funds for the Network Montana Project. The project allocated money to a select group of K-12 schools and libraries to support programs and services.

The *1998-1999 Montana Information Technology Plan* is the Department of Administration's Information Service Division's biennial review of the government's technology and communications systems.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

In 1995, the Montana State Legislature allocated funding to establish the Governor's Blue Ribbon Telecommunications Task Force. The Task Force replaced the Montana Telecommunications Advisory Network. The Task Force was charged with examining the federal Telecommunications Act of 1996 and preparing a state action plan based on the federal document. The action plan examined and defined the state's obligation in developing universal access to telecommunications services. The proposal was finished in December 1996 and the recommendations were passed as Senate Bill 97-89. The task force disbanded in 1997 following the bill's passage.

The state owned networks include SummitNet, METNET I, and METNET BBS. The networks are collectively managed and maintained by the Department of Administrative Services (DAS), Office of Public Instruction, and the Montana University System. SummitNet evolved out of an earlier university network as the DAS began to develop a statewide data backbone. The network provides state agencies, county and local government, the university system, tribal colleges, and K-12 schools direct links to the Internet without dialing into an Internet service provider. METNET I is an interactive video network utilized by state agencies and the state university system for videoconferencing, state employee training and development, and classroom instruction for university students. The METNET BBS is a state owned bulletin board system for the K-12 community and state agencies.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Office of Public Instruction***

The Office of Public Instruction is responsible for overseeing the actions of the state's 490 school districts. Since each school district makes its own decisions on software, networking, and technology expenditures, the OPI acts in an advisory capacity with regard to educational technology and telecommunications planning.

■ ***Department of Administrative Service's Information Services Division (ISD)***

While other organizations and councils establish plans and policies, the Information Services Division (ISD) is the state agency responsible for making sure the plans get implemented. Under the direction of the Department of Administrative Services, the ISD's responsibilities are divided into four groups: Policy, Development and Customer Relations (PDCR); Computing Operations Bureau (COB); Telecommunications Operations Bureau (TOB); and the Systems Support Bureau (SSB). PDCR is responsible for setting and maintaining the computing and telecommunications standards for state agencies and state educational institutions. They also represent ISD with METNET and its development and deployment of distance learning networks. Maintenance and support services for METNET are the responsibility of TOB and SSB. TOB is responsible for the interactive video network and SSB is responsible for the bulletin board system.

■ ***SummitNet Executive Council (SEC)***

The SummitNet Executive Council (SEC) is one of the two major policy setting organizations for statewide infrastructure development (the other is the Information Technology Advisory Council). The SEC is in the process of reviewing the state's current infrastructure, its participants, and its ability to integrate the three networks, SummitNet and the two METNETs, into one. Ideally, the results of the SEC's study will show how to develop a single, cohesive educational network.

■ ***Information Technology Advisory Council (ITAC)***

The ITAC offers three services to the state. First, it reviews statewide information and data processing policies. Second, it makes recommendations regarding the application of new IT in state government. Finally, the ITAC advises the Department of Administration (and ISD) concerning long-term strategic planning for information technology in state government.

■ ***Montana Universal Access Program Oversight Committee***

The Montana Universal Access Program was organized in response to recommendations issued by the Governor's Blue Ribbon Telecommunications Task Force and Senate Bill 97-89. The Universal Access Program is Montana's equivalent of the federal E-rate program. The law establishes the Public Service Commission as the administrator of the universal access fund, which will be governed by an Oversight Committee. This committee will consist of users and industry participants who will meet quarterly with the commission to review revenue, discounts, and the administration of the interim Universal Access Program.

■ ***Higher Education Commission***

The Higher Education Commission is encouraging state institutions to implement distance education into their curriculum by attracting proposals to distance learning courses for funding. The Commission is especially focused on promoting Web-based courses. The Commission has already started to fund seven projects; the courses will become available on the Internet by fall 1998.

THE DRIVING FORCE

The state Department of Administration has overall responsibility for the management of the three state networks, with policy support from the Office of Public Instruction and the Montana University System. K-12 education has participated less vigorously in educational telecommunications and technology. Although the state government establishes the policies and provides funding for educational initiatives, it relinquishes their final implementation to the local authorities. The lack of strong champions for K-12 initiatives at the state level, as well as the lack of training and technology support, has resulted in misunderstandings in the K-12 community concerning Internet connectivity. Although schools recognize the opportunity to have direct connections to the Internet via SummitNet, "last mile" connection costs remain expensive. As a result, schools typically opt for dial-up service, meaning that the benefits of a direct connect to the Internet are unrealized.

THE PLANS

■ ***Network Montana Project***

The Network Montana Project (NMP) began in 1995 with a $2.5 million Network Infrastructure for Education grant from the National Science Foundation. NMP's goals focus on building and maintaining "a statewide coalition of academia, government, and private sector membership that would be responsible for developing a rural community networking model." The network also supports state mathematics and science projects and develops multimedia network-based materials. The project has been coordinated with the development of SummitNet and has provided funds to a select group of K-12 schools and libraries in the state. In addition to supporting the development of curricula, the NMP funds have been used by school districts to establish programs and services.

■ *Reach for the Sky*

The Reach for the Sky Project, centered at Western Montana College of the University of Montana, is one of the Rural Telecomputing Math and Science Projects that was funded by the Annenberg/CPB Math and Science Project and the US West Foundation. The Project received funding of one million dollars for the costs of operating and implementing the plan to provide telecommunication skills to the K-12 teachers.

The Project, which started in 1993 and was completed in 1997, was successful in meeting all the goals. The goals were to develop online telecomputing Math and Science activities, create partnerships between teachers and the global community, link students to people and resources around the world, provide teacher training through online classes, presentation and peer collaboration, and create and reference Internet Math and Science resources. Between 475 and 500 teachers participated in this project with four other states. The participants had taken three online classes with two sets of workshops at Western Montana College.

■ *Department of Administrative Service's Information Service Division (ISD)*

The 1998-1999 Information Technology Plan is ISD's biennial review of the state's technology goals. The plan has three sections. Section 1 describes the current information technology (IT) environment in terms of the enterprise organization, state IT expenditures, and the current information technology architecture. Section 2 details the enterprise strategic planning efforts undertaken during the last biennium. Section 3 provides ISD, state agency, and University IT plans. These plans detail each organization's mission, major projects for the upcoming biennium, the business goals these projects support, and the accomplishments from the previous biennium.

■ *Montana Universal Access Program*

The Montana Universal Access Program will provide $750,000 over a two year period to establish advanced telecommunications services for libraries, schools, health care centers, and other public institutions in every community in the state. The advance service will be at least a 56 kbps dedicated or switched line that will provide users access to voice, data, graphics, and video telecommunications technology. Funds will also be allocated to those communities which have already established such a network connection to help defray transport costs. The first priority will be to provide funding for at least one public access point in each Montana community.

■ ***The Burns Telecommunications Initiative***

Named after Senator Conrad Burns, Montana's strong proponent of educational telecommunications in Washigton, the Burns Telecommunications Initiative represents a major focus of the Montana State University Centennial Campaign and a crucial element in the redefining of the University's land grant mission. The initiative includes services and strategies for connecting rural Montana with state, national, and international resources using telecommunications.

■ ***Western Montana College***

Western Montana College is in the beginning stage of providing courses via distance learning. It is in the process of assessing students' needs with the limitation of the school's budget. In the past academic year, Western Montana has offered 6 undergraduate courses via distance learning, where approximately 35 learners participated over the Internet and 10 learners participated through interactive video.

■ ***Montana State University–Bozeman***

In the past academic years, Bozeman has offered 40 graduate courses via Internet and interactive video, where approximately 750 learners participated. The most popular and effective distance learning methods currently in use at the Burns Telecommunications Center are interactive video and telecomputing courses. Presently, Bozeman is offering an interdisciplinary Master of Science Education (MSSE) degree program by Asynchronous, computer-mediated communications.

Bozeman's outreach mission at the Burns Telecommunications Center is to extend its programs and resources to connect all Montanans through technology. Bozeman has been established as a provider of providing educational programs and related support services by distance learning through programs such as the following: MSU Outreach Network, Virtual Medical Center, National Teachers Enhancement Network, American Indian Research Opportunities and Young Scholars Programs, and Extension Outreach.

■ ***Montana State University–College of Technology***

The College of Technology is affiliated with the Montana State University at Bozeman. Servers are located at Bozeman, where the College of Technology had offered three undergraduate courses via Internet. College of Technology also has access to the METNET, where it provided a pre-algebra course via two-way interactive video.

■ ***Montana State University–Northern***

Northern is affiliated with Vision Net which provides their infrastructure. Vision Net is a telephone cooperative that provides fiber optics. Thus, Northern had offered most of their courses via two-way interactive video and some courses via Internet.

■ *University of Montana*

The University of Montana offers four external graduate degrees: ❶ Master of Business Administration, ❷ Master of Education, ❸ Education Doctorate; and ❹ Pharmacy Doctorate The MBA program is delivered over the state METNET Interactive Video system in Billings, Butte, Great Falls, Bozeman, Kalispell, and Missoula. The M.Ed. is offered in Kalispell, as well as in Browning on the Blackfeet Reservation. Courses are taught utilizing the state METNET system The Doctorate of Pharmacy degree is delivered statewide through the Internet (interactive), and video tapes (non-interactive/self-directed study). For the Ed.D., students meet in Missoula three weekends in the spring and fall semesters and for three weeks in the summer semester. The total umber of students expected to enroll in these programs for the 1998-99 academic year is approximately 230.

THE FUNDING SOURCES

■ *K-12*

The state legislature does not specify programs when it allocates money for public education. In the 1996-97 legislative session, the state of Montana apportioned $12.5 million in a one-time block grant. This money was available during the 1997-98 school year, and represented about $76 per student. Originally intended for technology and telecommunications networking, the funds were broadened to include books and general maintenance. Unfortunately for the state Office of Public Instruction, there was no mandate written for the school districts to report on how the money was spent.

Another source of funding for K-12 technology stems from money received from taxes on the timber industry. The fund receives the taxes on income over and above $30 million to a maximum of $50 million, the "sustainable yield" for timber in the state in a given year. To date, the tax has raised $1.6 million for education.

■ *The Montana Universal Access Program*

The Montana Universal Access Program will provide funds that will allow Montana to establish its own E-rate separate from the federal funds. The funds will come from a surcharge on intrastate telecommunications services and will be made available to schools, libraries, healthcare providers, tribal colleges, and community access points. The program provides $250,000 in 1998 and $500,000 in 1999 for Internet access funding. The Public Service Commission will administer the program under the direction of the Montana Universal Access Program Oversight Committee. Each school district, organization, institution, or consortium is responsible for submitting technology plans to the state library for approval. Once the plan is approved, the school district, organization, institution, or consortium must submit its own E-rate application to the federal government. Montana, the second largest state in the country, has only one designated urban area under the federal guidelines. As a result, school districts awarded federal E-rate funds will receive at least a 50 percent discount.

TECHNOLOGY

■ ***Department of Administrative Service's Information Services Division (ISD)***

ISD oversees three networks in Montana: SummitNet, the state owned and operated data communications service; METNET Interactive Video Network, the state videoconferencing network; and METNET BBS, a statewide bulletin board.

The state university system originally operated SummitNet as its multi-protocol network. In 1994, the state's Information Services Division took control of the network. SummitNet connects 130 sites in 56 counties, including connections to over 100 schools in 25 districts, the entire university system, libraries, and state agencies. The digital network uses frame relay, remote routing, high-speed digital circuits and provides remote access dial-in hubs to the 56k and T-1 service. Rural communities and districts which are not located near a hub site have expensive connection fees to the network. Universal Services Funds may help offset some of the connection and wiring fees. Some school districts have taken the initiative to purchase modems for connection to local Internet service providers.

ISD also administers the two METNETs. The Montana Educational Telecommunications NETwork (METNET) Interactive Video System works on compressed, H.320 standards based, two-way video, connecting 17 sites throughout the state. By utilizing alliances with other video conference systems, the network plans to increase the number of its sites to 25. The network is available for use by state agencies, higher education, K-12 schools, and approved non-profit corporations. It is utilized for interactive video classes, training, and hearings between METNET sites, and allows users to access the satellite uplink/transmitter at Montana State University for statewide video teleconferences, as well as national and international interactive video-conferences. Education accounts for 57 per cent of the monthly activity.

The state legislature established the METNET BBS in 1990 to provide electronic communications to the K-12 education community. In November 1996, the Department of Information Services contracted with the Office of Public Instruction to use the network for state agencies as well. This network is available to all schools through a local dial-up connection, but may be eventually replaced by SummitNet.

■ ***METNET Interactive Video Network***

In cooperation with the School of Business and the University's Center for Continuing Education and Summer Programs, the Telecom Center at the University of Montana–Billings has been responsible for the delivery of an MBA telecourse program, a Master's in Education program, and other credit and non-credit courses. The two-way interactive, compressed video system began operating in the 1997 fall semester. Students at several sites throughout the state enrolled in the courses. The studios are located in Butte, Helena, Billings, Kalispell, Great Falls, Miles City, Bozeman, Havre, Missoula, Dillon, Warm Springs, and Colstrip.

OTHER MISCELLANEOUS BUT RELEVANT INFORMATION

Big Sky Telegraph is a well-established educational affiliate of the National Public Telecomputing Network (NPTN). The free dial-in system links rural schools to information resources, establishes mentor relationships among teachers, and provides a basis for community development projects.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

The cumulative experiences of many states attest to the fact that a state's political infrastructure is one of the most critical factors underlying the development of educational networks. For years, Montana's approach has been to pass control of many issues to the local level. This approach results in a lack of vision, direction, and guidelines, and frustrates opportunities to develop a cohesive statewide network. Passage of the Montana Universal Service Program will undoubtedly assist local efforts to gain access to telecommunications services, but without a coordinated effort and guidance from the state, the result of the program may very well be a hodgepodge of technology. Although the Information Technology Advisory Council and SummitNet Executive Council concentrate on policy for their respective departments and networks, the dissolution of the Governor's Blue Ribbon Telecommunications Task Force left the state without a collective group to examine telecommunications policy as a whole. Given this background, Montana's ability to offer its students improved educational resources through technology will continue to be a slow and expensive undertaking.

NEBRASKA

ACRONYMS AND NETWORKS

- NEIS—Nebraska K-12 Education Internet System
- NETC—Nebraska Educational Telecommunications
- NIDLPS—Nebraska K-12 Interactive Distance Learning Pod System
- NIN—Nebraska Information Network
- NITC—Nebraska Information Technology Commission

EXECUTIVE SUMMARY OF THE STATE

Nebraska continues to pursue both statewide and local planning for educational technology and telecommunications. The Nebraska Information Technology Commission, which is responsible for creating a statewide vision for information technology, released the first draft of its statewide technology report in June 1998. Connecting educators to the Internet remains a priority in Nebraska, as does the establishment of a K-12 interactive distance learning pod system. Fortunately, the state lottery has provided a significant portion of the funds necessary to make the connections for the K-12 interactive distance learning pod system. At present, approximately 200 or two thirds of the Nebraska K-12 school districts have distance learning classrooms in place and are connected to their own networks. In 1993, the Nebraska Unicameral passed legislation (LB403), which gave tax levying authority to intermediate educational service providers called Educational Service Units. The revenue collected from the 0.5-cent levy was used to put in place the Nebraska K-12 Educational Internet System. This frame relay system now provides all schools in Nebraska with the opportunity to connect to the Internet. In 1996, the Nebraska Unicameral established the Education Technology Fund in the amount of 13 million dollars. This fund is providing grants to schools to connect to the Internet and to put in place their own local area networks. To date, 100 percent of Nebraska K-12 school districts are connected to the Internet and 75 percent have their LANs in place. The state has also invested lottery funds in the support of planning efforts at the school district level for the NIDLPS. Nebraska Educational Telecommunications' NEB*SAT is reevaluating the role of satellite technology as the state increasingly relies on fiber optics and computer technologies.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Nebraska's position as a solid player in educational telecommunications rests in part on the early efforts of Nebraska Educational Telecommunications' NEB*SAT network. Nebraska was the first state to purchase a dedicated multiple-channel satellite transponder for statewide educational use in 1991. Since that time, educators have gained access to other forms of technology, as well. The satellite network is primarily used for one-way delivered programming to K-12 schools and for interactive connectivity among the distance learning pods.

In 1992, the State Division of Communications began to build a statewide network backbone using frame relay technology, and legislation passed in 1993 established the state's Educational Service Units (ESU) as regional hub sites. Beginning in 1994, educators throughout the state were able to take advantage of connections to the Internet provided via 56 KB lines to their ESU or dial-in long distance service. Increased demand for connectivity led to additional funding in 1995. Direct connections between every school building in the state and the Internet will take place by June in the year 2000. As of January 1, 1998, direct connections had been made to over 96 percent of the buildings.

A major initiative was launched in 1993 to install distance learning classrooms in all K-12 school districts that were in turn electronically connected for interactive telecommunication use. Lottery and NEB*SAT grants were used as the funding source to plan and install this pod system. To date, approximately two-thirds of the Nebraska K-12 school districts are connected or are funded to complete these connections. Planning is currently underway to find the best way to put in place a fiber-based statewide backbone to connect all the distance learning pods.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Nebraska Information Technology Commission (NITC)***

The NITC is an initiative from the governor's office, which was created in November 1997. The NITC was formally established in statute in May 1998. Advisory councils of government, education, and community (private sector) members, and the 10-member NITC was formed to provide a statewide vision and strategic plan for information technology. The NITC is also charged with developing recommendations to the governor and the legislature concerning criteria for allocating state resources. The commission includes three steering councils representing educational, governmental, and community users (the government council operated in previous years as the Nebraska Information Resources Cabinet). The councils' primary purpose is to determine needs, set priorities, and recommend actions for resolving technology-based issues and problems that confront each group of users. By focusing on the users whom technology serves, rather than the technology itself, the councils are meant to provide the foundation for a needs-based approach to technology investment and development.

■ ***Nebraska Department of Education***

The Nebraska Department of Education (NDE), since 1993, has assumed a leadership role in planning and consulting with educational service units and school districts in the establishment of the Nebraska Educational Internet System and the Nebraska K-12 Distance Learning Pod System. Their role has also been to work closely with schools and ESUs in the area of staff development in technology, and in identifying and delivering educational resources for the classroom. NDE also works closely with Nebraska Educational Telecommunications in technology initiatives, ranging from instructional broadcasting to fiber optic-based distance education projects.

■ ***Nebraska Educational Telecommunications (NET)***
Nebraska Educational Telecommunications is the state's public telecommunications provider. The State of Nebraska (Nebraska Educational Telecommunications Commission) and the University of Nebraska govern NET. NET's production facilities are arguably the best in the nation, and its services include noncommercial television, radio, satellite and audio, video and multimedia production, and Great Plains Network, an educational media library.

THE DRIVING FORCE

The primary impetus for the establishment of technology in education in Nebraska has been and continues to be the sparsity of population within a state with a large geographical expanse. This has prompted cooperation among K-12 schools, educational service units, the Nebraska Department of Education, higher education, and Nebraska Educational Telecommunications. This has been the rule, rather than the exception, especially with regard to the planning and implementation of information technology in Nebraska. There is evidence, however, that the state will begin to assume a greater role in coordinating activity, as indicated by the activities of the Nebraska Information Technology Commission.

THE PLANS

■ ***Nebraska Information Technology Commission (NITC)***
In June 1998, NITC released its document, A Statewide Information Technology Infrastructure Planning Process. The plan is an updated version of the *1995 Nebraska Statewide Telecommunications Infrastructure Plan*. The new plan includes four sections, which outline the current climate of information technology, and reflects the NITC's action items. Emphasized throughout the document is the need for a collaborative approach to recommending policies, procedures, standards, and guidelines to plan for, acquire, implement, and manage the state's information resources. NITC's education, government, and community councils are focusing their efforts on reviewing and updating needs assessments of their respective sectors, which will be added to the state plan in September 1998.

■ ***K-12***
The Nebraska Department of Education is encouraging all K-12 districts to connect to their Educational Services Units using the telephone companies' provided statewide public frame relay network. Nebraska telephone companies installed the nation's first statewide frame relay network in 1993 as a result of a joint public-private planning effort. This network has now reached every public K-12 institution in Nebraska, and provides every school district with a minimum (56kb) Internet access.

The Nebraska Department of Education has also been a key player in the implementation process of the Universal Services Fund created by the Telecommunications Act of 1996. School districts representing 95 percent of the student population have applied for the E-rate. This will amount to approximately a $3 million savings to school districts each year on charges for their Internet and distance learning connections. NDE has played a key role in designing the model, and providing the capability for electronically filing and certifying local technology plans required by this federal program and other funding sources.

With additional funding from the legislature's conversion of the state weatherization fund to grants for schools to install wiring for local networks, Nebraska now has 90 percent of all classrooms wired for the Internet.

Distance education in the K-12 setting centers on the state's Distance Learning Consortium, that is, pods of schools agreeing to work together to contract for distance learning connections. After schools have formed a legal consortium entity for the purpose of contracting services, they usually apply for funding from the Nebraska Excellence in Education Commission (Lottery money) or from the Federal Rural Utility Services (RUS). The grant monies are used to pay for all of the classroom equipment and the providers' fees for engineering and installation.

The first terrestrial distance learning pod, Network 4 of NEB*SAT, is located in the Sandhills region of Nebraska. A consortium of five local schools cooperated with Nebraska telephone companies and NEB*SAT in the construction of the fiber optic based network. Connection to the rest of the state was accomplished with the installation of a NEB*SAT Network 3 satellite uplink system. Four additional schools joined the consortium in 1997. Each of the nine schools within the pod is connected via underground fiber using analog technology. Since 1993 the installation of additional pods has come on-line rapidly. Two hundred school districts are now participating. At present, all schools within the pods are connected via land lines using cable phone company lines. The few pods that are connected to one another are now connected via satellite. Attempts are underway to provide other options for the interpod connections. The process will be handled through the NITC.

In 1994, the rural telephone companies formed a non-profit organization called the Nebraska Information Network (NIN) with the mission to coordinate among its members help for rural areas with educational, health care, and economic issues. With NIN as the contact point for telephone companies, five additional consortiums came on line in 1996 and 1997, using the state-of-the-art digital technology serving approximately 80 school districts and four colleges. In 1997, the school districts in southeast Nebraska started building an analog distance learning network using cable companies as the carrier.

■ ***Nebraska Educational Telecommunications***

NEB*SAT is deploying a video-on-demand system which is scheduled to be online in the fall of 1998. This system can be distributed using the existing digital video channels, the data channels, or by using the Internet. Internet data delivery by satellite is also being developed. The direct-to-school distribution of educational programming will make a variety of programming available to K-12 schools, community colleges, state colleges, libraries, and government offices. NET is also considering the future of its NEB*SAT satellite distribution system; NEB*SAT's satellite transponder contract ends in 1999.

NET has recently contracted with consultants to assess the current status of NET's infrastructure and to plan for the future. The consultants were asked to develop two technical reports. The first report is an assessment of the existing technology, and the second report is a technical plan recommending changes to the infrastructure. The consultants are expected to formulate a plan to upgrade, enhance, and perhaps replace the current system to better serve the State's educational telecommunications needs into the twenty-first century.

Nebraska Telecourse Network is a college-level telecourse service, broadcast over Nebraska ETV Network and accredited by several state and community colleges in Nebraska. College lectures covering topics including business, economics, and psychology are broadcast for viewing or taping.

- ***University of Nebraska***

The University of Nebraska's technology priorities include providing support for faculty and other developers of advanced applications, upgrading the campus' physical network to support inter-institutional end-to-end broadband connectivity for new applications, and providing support for the Great Plains Network. The University of Nebraska is aggressively developing electronic information services at each of its four campuses and at the Institute of Agriculture and Natural Resources at UN-L. The University is also preparing for its role as a participant on Internet2.

- ***Metropolitan Community College***

The Metropolitan Community College system interconnects with NETV's NEB*SAT system statewide distribution. The college system has a six-site two-way interactive classroom system interconnecting the college's three campuses. Presently, the Metropolitan Community College provides telecourses for students to take college-level classes. Students view the courses on videotapes and correspond with the professors via phone or e-mail. The college has offered 42 telecourses this summer. As the K-12 distance learning pod systems develop, more of the community colleges are participants, taking full advantage of teaching dual credit courses to high school students.

- ***Nebraska Educational Television Council for Higher Education (NETCHE)***

Since 1966, NETCHE has produced and distributed instructional programs to supplement classroom instruction. NETCHE assumes a facilitating role with its Nebraska affiliates as they begin to utilize the NEB*SAT satellite system for information exchange.

THE FUNDING SOURCES

■ K-12

Proceeds from the Nebraska State Lottery support Education Innovation Fund grants. In 1997, more than $8 million in grants were distributed to 30 projects throughout the state. Two types of grants are funded. Major competitive grants of up to $15,000 (Tier 1) or up to $300,000 (Tier 2) support the implementation of innovative programs or practices, which address needs documented in the strategic school improvement plan (SSIP) of the public school district to be served by the project. Mini grants are also available. Planning mini grants are capped at $5,000, and are one-time grants that support the development or revision of district-wide strategic school improvement plans. One-year implementation mini grants of up to $5,000 are available to Nebraska public school districts with annual (general fund) expenditures of $350,000 or less. Eligible school districts can use the grant money to work on school goals, which are aligned with the Education Innovation Fund's statutory funding priorities. A governor-appointed Excellence in Education Council develops policies and procedures for the administration of the Education Innovation Fund. The eleven-member Council represents teachers, administrators, parents, school boards, business, post-secondary institutions, educational organizations, and the general public.

Lottery funding has also supported the School Technology Fund, which provides for connecting schools to the Internet, since 1996. Approximately $13 million in grants is made available to schools for computer information technology. The first priority of the School Technology Fund is connection, but monies may also be applied to developing networking capabilities within school districts, and the purchase of other telecomputing equipment.

A federal grant program called the Technology Literacy Challenge Grant Fund has provided schools with $3 million for the purchase of computers. Another $5 million will be distributed over the next three years for staff development in technology. This grant money is available to schools on a competitive basis, with priority given to districts with a high incidence of low-income families and districts that demonstrate a high technology need.

The Nebraska Mathematics and Science Initiative, a coalition involving educators, colleges and universities, the Nebraska Department of Education, and various professional organizations, sponsors Energy Grant Awards under contract with the Nebraska Energy Office. The awards are supported by Exxon oil overcharge funds.

The grant program supports two categories of awards: grades K-6 and grades 7-12. Some of the grant awards support technology-related projects.

■ E-rate

The E-rate initiative in Nebraska has been successful. School districts representing 95 percent of the student population have filed for the Universal Services Fund. It is anticipated that this will result in a savings of approximately $3 million annually in reduced line costs for both Internet and distance learning. The state created an electronic filing system to facilitate the application process, and developed a technology planning model for the state's e-rate plan. Three hundred and forty-seven school districts and ESU have filed and been certified. Once certified by the state, schools submit the required forms to the federal government.

TECHNOLOGY

■ *Nebraska Information Network (NIN)*

The Nebraska Information Network, funded by its rural telephone company members, has made digital technology for distance learning affordable through coordinating each company's discounting of services on the public telephone network. In the fall of 1998, they will complete the connection of the digital switches in the northeastern and southwestern regions of the state, as part of the statewide educational backbone. The single new analog distance learning network in the southeastern part of the state is looking at ways to interface with the digital infrastructure. The telephone companies involved in their first distance learning network, which used analog technology, have asked NIN to search for funding to assist with their conversion of that network to digital.

Four new school district consortiums have just received bids or have issued RFPs for the building of distance learning networks. Two of the schools have received bids from the telephone industry for digital networks, and from the cable industry for analog networks. With the completion of these four projects, approximately 80 percent of the state's land territory will be covered by distance learning networks.

■ *Nebrask@ Online*

Nebrask@ Online is a state government-run service that provides access to state records and documents. In addition, users of the network can make filings and submit documents to state agencies through the use of the network. The network's services include motor vehicle registration, title registration, access to Nebraska's state statutes, records of incorporation, court information and records, and a series of bulletin boards maintained by various professional associations for their members. The network also offers access to a number of state government resources on the Internet. Access to Nebrask@ Online is $50 annually, plus $0.12 per minute when using the 800 number access service. Users connecting through the Internet do not incur this fee.

■ *Nebraska Educational Telecommunications (NET)*

NET operates the NEB*SAT system, Nebraska's multiple-channel satellite and fiber optic educational telecommunications network. NEB*SAT offers four services. Network 1 is NEB*SAT's broadcast channel, and provides public television and radio service via nine television transmitters and nine radio transmitters across the state. Network 2 is NEB*SAT's instructional service, which distributes educational programming through a second broadcast channel. Network 3 is a compressed video service capable of 12 simultaneous one-way or six two-way interconnections. Finally, Network 4 is NEB*SAT's fiber optic service, which links groups of elementary, secondary, and post-secondary, schools to share two-way instruction.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Nebraska has embraced multiple technologies in its pursuit of educational telecommunications and technology, with a heavy influence on satellite. While this approach has often resulted in disastrous consequences elsewhere, Nebraska has been skilled, and fortunate, in its ability to coordinate its various networks. With all the ITFS, broadcast, satellite, and microwave systems to select among, however, there has been a decided push towards fiber optics and computer technology as the information age vehicles of choice in more recent discussions. The recommendations put forward over the next two to three years by the Nebraska Information Technology Commission will have a lasting impact on whether the state will continue to enjoy its many technologies.

NEVADA

ACRONYMS AND NETWORKS

- NDE—Nevada Department of Education
- SMART—Statewide Management of Automated Record Transfer
- UCCSN—University and Community College System of Nevada

EXECUTIVE SUMMARY OF THE STATE

Educational telecommunications and technology efforts at both the K-12 and higher education levels have centered on initiatives stemming from 1995's Senate Bill 204. Establishing connections between schools and the Internet, developing an automated student record transfer system, and expanding the telecommunications capabilities of higher education institutions have all been accomplished through the SB 204 funding. In addition, greater collaboration between K-12 schools and institutions of higher education in the state has taken place as higher education institutions have extended their networks into high school sites.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Senate Bill 204 from 1995 directed the Nevada Department of Education (NDE) and the University and Community College System of Nevada (UCCSN) to develop a statewide information network to improve access to information, and to increase public school and higher education students' access to interactive video and the Internet. SB 204 enveloped three initiatives. First, SB 204 allocated $5 million to the University and Community College System of Nevada to increase its telecommunications capabilities, with the caveat that the institutions must link to public schools. Second, SB204 allocated $400,000 to expand the Nevada School Network to all schools during the 1995-97 biennium. Until that time, the Nevada School Network had been a pilot project involving six school districts, NDE, UCCSN, the Nevada Rural School District Alliance, and WestEd. As a result of the funding, most of the schools and school districts across the state now have local dial-up Internet access. The third component allocated $1.8 million for the development of an automated student record system.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Nevada Partners in Education/Nevada School Network***

The Nevada Department of Education (NDE) and the University and Community College System of Nevada (UCCSN) collaborated in writing a report to the state legislature entitled, *Nevada Partners in Education.* The report, delivered in February 1997, described the expenditures and achievements that resulted from Senate Bill 204.

■ ***Nevada Distance Education Consortium***

The goal of the Nevada Distance Education Consortium is to create a cost-effective, innovative educational partnership, providing early exposure to the resources available at colleges and universities, and to increase the number of students graduating from high school and attending University and Community College System of Nevada institutions. The consortium includes five members: the University and Community College System of Nevada, the Community College of Southern Nevada, Clark County School District, the KLVX Communication Group, and the Desert Research Institute.

■ ***UCCSN Information Technology Council***

The UCCSN Information Technology Council is a system-wide advisory group formed to assist in setting the vision and overseeing the progress of the system's member institutions in matters of information technology.

THE DRIVING FORCE

Nevada has one of the nation's poorest records of high school students continuing on to postsecondary education. Fewer than 40 percent of Nevada's graduating high school seniors attend an institution of higher education compared with a national average of approximately 57 percent. One rationale underlying the expansion of the University and Community College System of Nevada's ITFS and ITV networks into high schools was the belief that exposing high school students to postsecondary courses might increase enrollments.

THE PLANS

■ ***K-12***

The Nevada Department of Education (NDE) used funds from its SB 204 award to support the development of its Statewide Management of Automated Record Transfer (SMART) system. SMART will automate and centralize student data for use by school staff and policy makers, and provide a tool to gauge the state's progress toward national, state, and local educational goals. Phase I of SMART included six initiatives. First, it included the development of a data dictionary for the streamlining and standardization of state and federal reports. Phase I also saw the development of administrative technology plans that focus on student records systems and networking for each school district and NDE. Third, the SMART NDE Repository and System was also developed and implemented. Fourth, SMART was implemented in six pilot school districts. Fifth, SMART data elements were transmitted from pilot sites to the NDE. Finally, SMART data were distributed to selected pilot school districts.

The SMART project has also initiated and completed the Phase II of the project that was provided $12.7 million dollars in funding by the legislature. Phase II consisted of seven initiatives. First, it included a plan to continue the implementation of the statewide system of educational accountability. Second, Phase II was to provide needed student information system and network technology to the Clark County School district and the eleven school districts not included in Phase I. Third, standards, procedures and protocols for and pilot school-to-school transcript exchange were established. Fourth, programs and procedures were established to integrate the SMART data files with the Statewide School Accountability Reporting software. Fifth, the improvement of the SMART data collection. Sixth, the improvement of the analysis and ad-hoc query functions of the NDE SMART System. Finally, the development of a system for public access to aggregate SMART data results.

As a result of the completion of Phase II, the SMART project has requested funding for Phase III. Phase III is seeking to continue and improve the initiatives started in Phase I and II.

The NDE used funds from Senate Bill 204 to connect schools throughout the state to the Nevada School Network. Presently there are more than 3,100 users of the Nevada School Network.

UCCSN worked with high schools to install ITV and ITFS equipment at high school sites so that college level courses could be taken by high school students for either dual high school/college credit or for college credit. Between the 1996 and 1997, a total of 107 number of course sections were offered in high school via ITV and ITFS, and 1,206 high school students enrolled in the courses.

■ *Higher Education*

UCCSN intends to continue developing its compressed interactive television capabilities. UCCSN plans also call for the expansion of its ITFS signal coverage on a more limited basis. In addition to its installation activities, UCCSN has developed and continues to expand dual high school/college credit courses, with the goal of increasing high school students' exposure to college level instruction.

Although institutions of higher education in Nevada do not offer entire degree programs via distance education, a number of universities and colleges host distance education courses. The University of Nevada - Las Vegas offers 12 distance education courses in subjects ranging from psychology to nursing. The University of Nevada - Reno distributes video classes through compressed video and ITFS microwave sources. Its ITFS sites include high schools in Washoe County, Fernly, Fallon, Yerington, and Carson City. Compressed video sites include Lovelock, Winnemucca, Elko, Ely, and UNLV. UNR's classes cover content in education, business, and liberal arts areas. The Community College System of Nevada offered 10 courses during the summer of 1998, relying on both interactive television and Internet resources. Great Basin College offered online courses in English, nursing, math, philosophy, religion, along with beginning software computer courses.

THE FUNDING SOURCES

■ ***K-12***

The Nevada Department of Education (NDE) allocated $400,000 from its award through Senate Bill 204 to increasing Internet access among schools. UCCSN allocated $800,000 of its appropriation to improving Internet access. Other funds made possible through SB 204 supported professional development, the development of World Wide Web based materials, and the posting of exemplary K-12 lesson plans on the web. A total of $81,000 was also allocated for the development of software to be used by school districts in generating their accountability reports.

UCCSN used $300,000 of its SB 204 award to purchase a third network hub for its statewide electronic network. The new hub, located at Great Basin College in Elko, lowers the communication costs associated with providing services to schools and UCCSN sites in northeastern Nevada.

TECHNOLOGY

■ ***Higher Education***

The University and Community College System of Nevada includes compressed interactive video and ITFS sites throughout the state. Senate Bill 204 supported an addition of 64 ITFS sites in Washoe County School District locations. SB 204 also provided support for interconnecting ITFS programming with two cable television systems in the Reno/Sparks area.

There are approximately 24 ITV college sites and 13 ITV high school sites. In Northern Nevada, there are 14 ITFS college sites and 17 ITFS high school sites. In Southern Nevada, there are 3 ITFS college sites and 167 high school sites, which include 148 middle and elementary schools.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Nevada offers one example of a state in which centralized planning is imposed through legislative mandate. As a large state with a relatively small, dispersed population, Nevada has been fighting an uphill battle with regard to establishing a statewide system for educational telecommunications and technology. Until Senate Bill 204, there was little centralized activity occurring at the Nevada Department of Education, and even less collaboration between the NDE and the University and Community College System. Creating the ITV and ITFS connections in high school sites, training school personnel, and developing courses for high school students required a high degree of cooperation that the participants had never been called upon before to exhibit. Now that the funds from SB 204 have been allocated and the 1995-97 biennium activities wrapped up, it remains to be seen whether the collaborative spirit will continue to grow in Nevada, or whether the participants will retreat to focus once again on their own needs.

NEW HAMPSHIRE

ACRONYMS AND NETWORKS

- CITS—Computers in Schools Program
- DLC—Distance Learning Commission
- NHPTV—New Hampshire Public Television Network
- USNH—University System of New Hampshire

EXECUTIVE SUMMARY OF THE STATE

New Hampshire's educational technology and telecommunications initiatives progress at the local level. In the absence of state funding, many K-12 schools have received support from federal initiatives, including Goals 2000 and the Technology Literacy Challenge Fund, private businesses, and consortia. The Department of Education released a Statewide Educational Technology Plan in 1997 that pointed out the need for both local technology planning and a formalized structure for state technology leadership. The plan is currently under revision and will be published in October 1998. The University System of New Hampshire continues to refine its long range, five-year plan (LRP) for administrative computing that began in 1994.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The New Hampshire Educational Improvement and Assessment Program (NHEIAP) was signed into law in 1993. Through NHEIAP, curriculum frameworks that define what students should know and be able to do were established, a statewide assessment system based on the frameworks was implemented, and school districts developed local improvement plans aimed at helping all students achieve high standards. References to using technology appeared throughout the New Hampshire Curriculum Frameworks. Most of the initiatives in New Hampshire today that aim to strengthen the state's schools reflect NHEIAP and its mission, and include strong educational technology components, as well.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***New Hampshire Public Television (NHPTV)***

NHPTV plays an active role in New Hampshire's educational technology planning and promotion, largely through the activities of its Knowledge Network. Knowledge Network provides services to K-12 educators and their students ranging from PBS programming to satellite videoconferencing to teacher training. NHPTV is licensed to the University of New Hampshire and is overseen by an 18-member Board of Governors, a subcommittee of the University System of New Hampshire Board of Trustees. NHPTV has representatives on a variety of state boards and committees including the Distance Learning Commission, the National Teacher Training Institute for Math, Science, and Technology, New Hampshire NetDay, and the New Hampshire Telecommunications Consortium.

■ ***Higher Education***

■ ***University System of New Hampshire (USNH)***

The University System consists of the University of New Hampshire at Durham and Manchester, the State Colleges at Keene and Plymouth, and the State-wide College for Lifelong Learning. A dozen other organizations, including the New Hampshire Cooperative Extension and New Hampshire Public Television, are affiliated with USNH.

A single Board of Trustees governs the University System institutions. USNH's Information Technology Coordinating Council (ITCC) has the responsibility of overseeing USNH's long range plan for administrative computing. The ITCC includes the chairs of various steering committees involved in information management, and the technology directors from the USNH institutions.

■ ***Distance Learning Commission***

The state legislature created the Distance Learning Commission in 1996. The commission's 17 members include representatives from the state Department of Education and Board of Education, administrators and faculty from K-12 and postsecondary institutions, and the business and public sectors. The mission of the commission is to promote and advance distance learning for all New Hampshire citizens through affordable access and state-of-the-art technology for professional development and academic schooling.

THE DRIVING FORCE

Money, or rather the lack of it, undermines technology and telecommunications development in the state. Governor Jeanne Shaheen came to office two years ago on a campaign platform that emphasized getting every school in the state wired to the Internet. That vision is just now beginning to take place. Nevertheless, the consistent lack of state revenue available for K-12 and higher education technology initiatives hampers progress. As federal sources of support comprise most of the technology funds for K-12 projects, federal guidelines and policies will continue to influence the state's planning efforts over the next few years. The push in higher education, meanwhile, comes from a call for efficiency, as the development of the University System of New Hampshire's administrative computer system attests.

THE PLANS

■ ***K-12***

In March 1997 the Department of Education unveiled its *Statewide Educational Technology Plan*. The plan reflected other planning efforts taking place in the state, such as *New Hampshire's Consolidated State Plan*, the Technology Literacy Planning Fund Application, and the Goals 2000 Application. A Technology Committee, organized by the NH Department of Education, had the responsibility of creating the plan and its strategies to support the effective integration of technology within the state's education system. The state's technology plan incorporated three areas identified in the federal Technology Literacy Challenge Fund application: long-term strategies for financing technology education; collaboration with other agencies, organizations, and institutions; and steps to provide assistance to local education agencies with the greatest proportion of children in poverty and greatest need for technology. An additional area the New Hampshire plan highlighted was the need for technical planning by local education agencies in the state. The technology plan identified six goals for the state's educational technology pursuits. Four of the goals resemble the national goals for educational technology. The other two goals--one that addresses the need for local technology planning and the other to formalize a structure for state leadership--addressed the most pressing needs in New Hampshire.

Educators in New Hampshire also benefit from projects in their implementation stage. The Education Connection Initiative is a consortium of business and educational organizations promoting the development of educational technology. The partners include Bell Atlantic, Cabletron, the New Hampshire Department of Education, the New Hampshire State Library, New Hampshire Public TV, and the University of New Hampshire, and WINGS. The initiative's goal is to connect K-12 schools and libraries in the state to the Internet with a minimum of a 56k frame relay circuit within the next 12 to 15 months. Bell Atlantic and Northern Telecom are working with schools and libraries to develop technology plans and will provide free access to the network for two years. Cabletron is providing $2 million in equipment for the smart switch that will interface with Bell Atlantic, and is training Bell Atlantic service employees to make the connection. The University offers an ISP option, and the NH Public Television (Knowledge Network staff), NH Department of Education, and NH State Library will provide training for faculty and administrators. The biggest deterrent to the initiative's implementation is cost. Bell Atlantic will provide $3 million and Cabletron will provide $2 million to make 850 connections to the 470 schools and 260 libraries in the state.

A final statewide initiative to place technology in New Hampshire classrooms is the governor's Computers in the Schools (CITS) program. Under this innovative program, businesses, state and federal agencies, and private individuals donate surplus computers that are in need of upgrades and no longer in service. Inmates from the Department of Corrections Prison Industries rehabilitation program upgrade the computers to Pentium or Pentium class computers (166mz or better) with 32 mb RAM at a cost of approximately $300 each. At no cost to schools, Prison Industries delivers the newly upgraded computers to qualifying schools that meet simple Department of Education eligibility criteria.

- ***Higher Education***
- ***University System of New Hampshire (USNH)***

In September 1994, the USNH Board of Trustees approved a five-year long range plan (LRP) for administrative computing. The Board directed that yearly updates be given on the status of the implementation of the projects that were approved for the long range plan. In the last iteration of Version 1 of the LRP, the ITCC acknowledged the tremendous growth in World Wide Web use that was unanticipated in the long range plan's initial planning stages. The ITCC has begun to develop Version 2 of the LRP, which will take into account the rapid changes in technology. Another deficiency seen in Version 1 of the LRP was the lack of specific information concerning the financial and human resources commitments from USNH's individual institutions. Although the LRP describes expenditures associated with the initial purchase and installation of the hardware and software for LRP projects, the continuing annual operating costs that result from project implementation are not detailed. Version 2.0 of the LRP will specifically address these cost issues.

The University System of New Hampshire's interactive television is administered by the College of Lifelong Learning's Office of Educational Television Network (NHETN-ITV). The mission of the Network is to provide greater access to educational, training, and other resources concerning transfer of information to the citizens of the state.

THE FUNDING SOURCES

■ K-12

In October 1996, sixteen New Hampshire districts received first-year funding under the federal Goals 2000 program to support local initiatives, many of which had a strong technology component. Technology was one of three priorities for LEA grants in the state's fiscal year 1997 Goals 2000 application.

New Hampshire received a total of 28 proposals for round one of Technology Literacy Challenge Funds, and 67 proposals for round two. Of the first round proposals, 19 were funded, and of the second round, 30 proposals were recommended for funding. The state was awarded a total of $950,000 in the first round and $2,019,000 in the second round of TLCF monies; the awards ranged from $20,000 to $100,000.

The Destek Group, a New England Internet Service Provider (ISP), offers schools a substantial discount on 56k direct Internet connections through the SchoolHouse OnRamp Program. More than 30 schools have been connected through this program.

MCI Communications Corporation has provided two regional education services organizations with discounted or donated T-1 lines to establish these agencies as Internet Service Providers for the schools in their region.

The MediaOne School Connections Program currently offers free broadband data services to New Hampshire public K-12 schools and accredited private elementary and secondary schools, wherever Media One Express is available. Through MediaOne Express, schools have unlimited access to the Internet; free use of one cable modem, free installation, free

World Wide Web browser and free technical support for the broadband data service. In addition, MediaOne sponsors training seminars, demonstrations, and opportunities for educators to participate in collaborative projects with broadband education content developers.

Within the Education Connection Initiative, of the $3 million provided by Bell Atlantic, $1 million is for capital improvements such as expanding both the switching capabilities and the frame relay system. The remaining $2 million is the expected line charges for the free service Bell Atlantic will be donating to schools for the two year period from March 1, 1998 to February 28, 2000.

TECHNOLOGY

■ ***New Hampshire Public Television***

NHPTV delivers both instructional and professional development programming over its statewide broadcast network. About 43 percent of New Hampshire's students and teachers have access to the NHPTV Knowledge Network. Knowledge Network also offers satellite-delivered videoconferences to educators, businesses, and communities. NHPTV's production facility includes a mobile unit, satellite receiving equipment, and a Ku-Band uplink.

■ ***The New Hampshire Educational Television Network (NHETN-ITV)***

The programs and the events are delivered live using two-way videoconferencing systems. Technicians support each of the 5 sites, where multiple remote-controlled cameras and voice-activated microphones are tools to serve as communications between the sites. In addition, digitally compressed video using CLI coders transmit over T-1 lines between the sites. Presentations are made at any of the site locations using computer presentational software, 35mm slides, the Internet, video and/or audio tapes.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

New Hampshire faces many challenges as it continues to pursue technology and telecommunications planning, particularly in the K-12 arena. It lacks both a statewide high-speed infrastructure and an agency or organization to advocate for building one. The state's record for educational equity is among the worst in the nation, partly due to the fact that New Hampshire has no income tax, which limits financial support for educational programs including technology initiatives. Education leaders recognize that technology and distance education offer one way to redress inequities. In 1996, the state legislature passed a bill that established a state policy that all students in the state, regardless of economic status or geographic location, deserve the educational benefits offered by distance learning through state-of-the-art technology. With so few schools possessing a technology plan (about 60 percent, according to a 1997 QED/Department of Education survey), it is unclear whether many educators are actually prepared for increased technology use.

NEW JERSEY

ACRONYMS AND NETWORKS

- CIO—Chief Information Officer
- NJDOE—New Jersey Department of Education
- NJIN—New Jersey Intercampus Network
- NJN—New Jersey Network
- OTIS—Office of Telecommunications and Information Services

EXECUTIVE SUMMARY OF THE STATE

In a number of ways, compared to other states New Jersey has created more connections between and among government and educational institutions. In February 1998, Governor Christine Todd Whitman appointed the state's first chief information officer (CIO). Educational technology in K-12 schools received a $250 million boost as a result of the Comprehensive Educational Improvement and Financing Act of 1996. This act calls for Distance Learning Network Aid totaling more than $50 million ($40 per pupil) in the 1997-98 school year, and for each of the succeeding four years for a total of more than $250 million. The fund is to establish statewide distance learning networks with every district a member by the 2001-2002 school year. In an effort to provide state and local government officials with access to a business Intranet, the Office of Technology and Information Services (OTIS) began implementing GovConnect in 1998. Within postsecondary education, the New Jersey Commission on Higher Education and the Presidents' Council adopted policy recommendations regarding technology infrastructure, interconnectivity, and distance learning, and the governor and state legislature created a Higher Education Technology Infrastructure Fund in September 1997.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

New Jersey's educational telecommunications and technology initiatives have a solid history of support. The Telecommunication Act of 1992 enabled the New Jersey Board of Regulatory Commissioners to act upon alternative methods of telephone utility regulation through Opportunity New Jersey, an incentive regulation plan to modernize the state's telecommunications infrastructure. The state has consistently appropriated funds for educational technology initiatives in K-12 schools, which have provided awards to classrooms, schools, resource centers, and regional consortia. New Jersey's institutions of higher education have also provided a significant stimulus for technology development in the state over the past two decades.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***State Chief Information Officer (CIO)***

The Governor's Chief Information Officer directs statewide information technology policy and development, coordinates information technology activities, and ensures that the state is receiving the maximum benefits from its investments. As chair of a virtual university design team, the CIO is overseeing the implementation of the Governor's vision for a New Jersey Virtual University.

■ ***Office of Telecommunications and Information Systems (OTIS)***

The Office of Telecommunications and Information Systems is charged with providing information processing direction, policy, resources, and information services to the executive branch of state government. Information processing services provided by OTIS include information systems analysis, design, development and maintenance, equipment operations, and network management. OTIS is a division within the Department of the Treasury.

■ ***New Jersey Department of Education (NJDOE)***

Within the state Department of Education, the Division of Information and Management Services oversees two offices involved with New Jersey's K-12 technology efforts, the Office of Information Technology and Office of Educational Technology. The Office of Information Technology develops and maintains the department's systems for collecting and analyzing information from school districts to satisfy state and federal reporting requirements. OTIS also develops and maintains the department's office technology systems. The Office of Educational Technology oversees all of the department's educational technology initiatives, the County Coordinating Councils for Distance Learning and Technology, the Distance Learning Network Aid program, federal technology grants, the Educational Technology Training Centers grant program, and other educational technology programs for New Jersey's more than 1.2 million students.

■ ***Commission on Higher Education***

Created through the Higher Education Restructuring Act of 1994, the New Jersey Commission on Higher Education provides coordination, planning, and policy development for the state's higher education system in collaboration with the New Jersey Presidents' Council. The 11-member Commission serves as the principal advocate for an integrated system of higher education. The system includes both public and independent institutions and enrolls 328,000 full- and part-time credit-seeking students statewide. The 31 public colleges and universities are comprised of Rutgers, The State University of New Jersey; the University of Medicine and Dentistry of New Jersey; the New Jersey Institute of Technology; 4 state colleges and 5 state universities; and 19 community colleges. The 25 independent institutions include 14 senior colleges and universities with a public mission.

■ ***New Jersey Intercampus Network (NJIN)***

The New Jersey Intercampus Network, Inc., (NJIN) is a non-profit corporation which fosters the development and implementation of video, voice, and data networking in higher education, libraries, and school systems in the state of New Jersey. Forty-six private and public colleges and universities are institutional members of the organization. A number of school districts, corporations, and government entities are cooperative members. When founded in the mid-1980s NJIN was supported entirely by the state through the Department of Higher Education. In 1993 it became a non-profit educational corporation which is supported by membership dues, service fees, grants, and contracts. NJIN operates through the Board of Trustees and a variety of task forces and committees, involving volunteers from all sectors of higher education, liaisons at every college, and many industry and government representatives.

THE DRIVING FORCE

New Jersey's educational telecommunications and technology growth over the next several years will be influenced by two key factors. First, the various funds allocated for K-12 schools and institutions of higher education target particular needs. Second, the recent K-12 and higher education statewide technology plans also prescribe applications and priorities for technology development.

THE PLANS

The Chief Information Officer is overseeing the development of plans to provide consumers with the highest level of government services by: strategically investing in technology, and developing partnerships to deliver responsive business solutions; creating a collaborative and challenging work environment; and providing easy access to timely and accurate information. Several information technology strategic teams are at work, focusing on IT governance, resources, process, and technology infrastructure.

■ *Office of Technology and Information Services (OTIS)*

OTIS has been involved in creating GovConnect, the state's government business Intranet. GovConnect will give state and local officials access to a network enabling them to conduct government-to-government business using e-mail, the World Wide Web, and the existing state operated Garden State Network (GSN). Participation on GovConnect will also be offered to non-profit organizations that represent the clients served by state agencies in delivering government services. GovConnect's implementation requires improvements to the communication infrastructure of the Garden State Network (GSN) maintained by the state. The GSN will be expanded to include a point-of-presence in most counties. Dial-in capability will be established through a series of local and toll free numbers. GovConnect became operational in mid-1998.

OTIS also oversees the One State-One Network initiative, which seeks to consolidate all current and future network-based applications within the framework of the Garden State Network (GSN). The intent is to provide one shared network based upon aggregation of total state needs and leverage resources including equipment, services, and personnel to affect even greater economies of scale. GSN is also being equipped with SONET and Asynchronous Transfer Mode (ATM) technology enabling a single infrastructure to carry voice, data, image, video, and text more efficiently.

■ *K-12*

The New Jersey Department of Education and the state's 594 school districts are moving forward vigorously to infuse educational technology in curriculum and the management of information for student achievement of the New Jersey's Core Curriculum Content Standards. The purpose is to accelerate the delivery of voice, video, and data so that all districts will have the opportunity to share curricular offerings, ongoing projects and programs, and professional development opportunities.

In 1997-98, a long-range technology plan was submitted to the Department of Education by each of the state's 21 counties and every public school district in New Jersey. As of January 1998, all county and public school districts in the state have department-approved, long-range educational technology implementation plans. By the year 2000, the New Jersey Department of Education expects these five educational technology benchmarks to be reached by every school district: ❶ minimum of five students to one multimedia computer, ❷ every teacher will be fluent in E-mail and technology usage, ❸ every classroom will have high-speed Internet access, ❹ every school will have a local area network and at least one distance learning classroom, and ❺ every district will have a Website and wide area network.

The Comprehensive Educational Improvement and Financing Act of 1996 (CEIFA) established the Distance Learning Network Aid. This program, beginning in the 1997-98 school year, allocates $40 per student or more than $50 million statewide over a five year period. The goal is to ensure that every student and teacher in New Jersey have equal access to a wide array of electronic services and can participate in electronic communities that will enable student achievement of the Core Curriculum Content Standards.

All 21 of the Educational Technology Training Centers (ETTCs) are now fully operational. Beginning in July 1997,the department awarded a total of $10 million in three-year grants to local school districts in each of the state's 21 counties to provide county-based resource centers that offer educators professional development opportunities. Funded by the federal Goals 2000 program and state funds, the ETTCs contain demonstration technology equipment and offer training programs to assist teachers in implementing the Core Curriculum Content Standards. In their first full year of operation (July 1, 1997 to June 30, 1998) the ETTCs provided turnkey professional development to more than 18,000 of the state's 86,000 teachers. The teachers trained are providing turnkey training for at least 10 teachers in their schools.

Established through an agreement reached in April 1997 by the Board of Public Utilities, Bell Atlantic and the New Jersey Ratepayer Advocate, Bell Atlantic's Access New Jersey is designed to link K-12 schools and libraries and should provide about $130 million in savings over the next four years. Access New Jersey includes ❶ offering educational discounts –ranging from 31 to 72 percent on services for ISDN, frame relay, SMDS, and ATM, ❷ building a high-speed voice, video and data network for those schools and libraries served by Bell Atlantic, and ❸ providing equipment for items needed by schools and libraries to connect computer and video equipment to high-speed network. As of June 30, 1998, Bell Atlantic reported that 262 contracts are underway with 136 K-12 public school districts, 21 non-public schools, and 105 libraries.

■ ***E-rate***

Schools, school districts, and libraries in New Jersey submitted 1,666 applications for Universal Service Funds during the window of opportunity. The New Jersey Department of Education facilitated the application process by sponsoring in-person, online, and satellite training programs in cooperation with the 21 county-based Educational Technology Training Centers and Tech Corps New Jersey.

■ ***Higher Education***

In February 1997, Governor Christine Todd Whitman proposed a higher education fund to further develop the infrastructure necessary for high-speed voice, video, and data transmissions. Based on that proposal, the governor and the legislature enacted the Higher Educational Infrastructure Fund Act in September 1997. The fund allocates $50 million, which will be matched by institutional funds, to assist New Jersey's public campuses, elementary and secondary schools, and libraries. The fund also provides $5 million for statewide library technology initiatives through the New Jersey State Library.

In September 1997, the New Jersey Commission on Higher Education adopted the *Report on Higher Education Technology*. The report resulted from the efforts of the Commission's and President's Council's Higher Education Technology Task Force, which was charged with making recommendations regarding technology infrastructure, interconnectivity, and distance learning. The report articulates the vision for higher education technology, and regulations were adopted to implement the report's recommendations related to the Higher Education Infrastructure Fund and to distance learning offered by New Jersey institutions, as well as any other institutions that establish a physical presence in the state. Also pursuant to the report, a Technology Advisory Committee was established to make recommendations on costs at New Jersey colleges and universities, and to work with a consultant to conduct an interconnectivity needs assessment and develop a request for proposal to further develop interconnectivity among institutions. The RFP is expected to go out in fall 1998, and the committee's recommendations regarding recurring investments will be made by January 1999.

■ *New Jersey Network (NJN)*

The New Jersey Network, the state's public broadcasting affiliate, broadcasts telecourses on behalf of more than 20 colleges in New Jersey and neighboring states. NJN sponsors Going the Distance, a special program for people who, for reasons of distance, lifestyle, or disability are unable to complete the academic requirements for an Associate's Degree. NJN telecourses used in the Going the Distance program, a cooperative effort among NJN, PBS, and five local colleges in New Jersey (Atlantic Community College, Brookdale Community College, Burlington County College, County College of Morris, and Cumberland County College), enable students to qualify for a two-year degree without ever leaving home. Students enroll in a participating college and receive courses via NJN stations. Four-year institutions using telecourses broadcast on NJN include New Jersey Institute of Technology (NJIT) and Thomas Edison State College.

THE FUNDING SOURCES

■ *K-12*

A 1997 New Jersey Supreme Court decision has provided schools with a total of more than $250 million for educational technology in Distance Learning Network Aid from 1997-2002. More than $50 million represents the first year amount, which was made available on July 1, 1997, and translates into $40 per pupil. One-third of the total funding amount to each school district must be spent on equipment and/or retrofitting of school facilities for voice, video, and data transmission. The $40 per student appropriation increased to $41 in 1998-99, based on a 2.67 percent rise in the Consumer Price Index. In subsequent years, the amount will be established biennially in the *Report on the Cost of Providing a Thorough and Efficient Education* and adjusted for inflation using the Consumer Price Index (CPI).

New Jersey schools have benefited from special tariff discounts available since September 1, 1997. The discounts resulted from an April 1997 agreement between the New Jersey's Board of Public Utilities (BPU) and the state's Ratepayer Advocate with Bell Atlantic. Bell Atlantic will build a statewide-high speed network by 2001 to give the state's 3,357 public and non-public schools and 310 libraries Internet access, full-motion video, and high-speed data transfer capabilities. The New Jersey Department of Education has been working with the BPU and Bell Atlantic to insure that the components of the settlement meet the needs for the Distance Learning Network Aid initiative.

The agreement is valued at approximately $130 million over a four-year period in savings, equipment, and services for schools and libraries. Under the agreement, schools have educational discounts on tariff rates, on a flat rate basis ranging from 31 percent to 72 percent for high-speed access to Internet and video services for schools and libraries. Bell Atlantic will also deploy a statewide high-speed network for voice, video, and data with all 28 special needs districts connected by the end of 1999, and all remaining school districts and libraries in the Bell Atlantic service area by the year 2001. The agreement also involves the establishment of an equipment fund for schools to obtain the equipment needed to connect to the high-speed network. In addition, Bell Atlantic has committed to fund a state coordinator to help schools determine their technology needs.

Through the first round of the Technology Literacy Challenge Fund, New Jersey received $3.75 million. The TLCF funds supported 40 grant recipients whose initiatives accelerate the full benefits of educational technology to all schools in the state for students to achieve New Jersey's Core Curriculum Content Standards. At least 50 percent of the total funds awarded went to districts that have a greater percentage of economically disadvantaged students than the statewide average. School districts received up to $95,000 to support technology projects. In TLCF's second round, the state received $8.5 million to fund more than 85 grant recipients. In the second round, school districts were awarded grants ranging from $65,000 to $200,000. Round three applications will result in awards of more than $4.98 million to approximately 45 local school districts.

New Jersey's Technology Literacy Challenge Fund–Technology Model Schools grant program is for those districts that have the greatest number of disadvantaged youth in the state (i.e., Newark, Jersey City, and Paterson school districts). Year one funding (November 1, 1998 to October 31, 1999) is anticipated to be $667,000 per award for a total of $2 million. It is anticipated that second-year funding (November 1,1999 to September 30, 2000) will be almost $1.2 million per award for a total of nearly $3.5 million. The total amount for this two-year grant program is approximately $5.5 million. The purpose of the grant is to establish a technology-enriched environment in at least one school in each of the state-operated school districts.

■ ***Higher Education***

In 1993, a law was passed creating the Higher Education Equipment Leasing Fund. In 1995, the Commission on Higher Education allocated the $7.5 million set-aside in that fund for emerging needs to purchase networking equipment for 39 colleges and universities that were then members of the New Jersey Intercampus Network (NJIN), which coordinated the project. The funds assisted in developing a statewide multimedia network to enhance teaching, learning, scholarship, and academic services. Video classrooms were established at each of the colleges and universities. The fund was also used to purchase high-performance workstations and Internet servers to support multicasting over the Internet. The acquisition of current technology Internet routers for each institution was a third component, and the acquisition of Video Uplink Equipment for satellite connectivity was a fourth. In addition, the Pilot Internet server operated at Rutgers University by NJIN was upgraded.

Governor Whitman and the legislature created a bond fund of $50 million to provide funding for improved technology and interconnectivity at colleges and universities in 1997. By requiring institutions to match the state's contribution dollar-for-dollar with campus or corporate funds, the proposal will generate a total of $100 million for technology infrastructure. The technology fund will be used to provide grants to institutions of higher education for the development of technology infrastructure within and among the institutions in order to provide access to information, educational opportunities and workforce training. The funds were allocated for the acquisition of higher education technology infrastructure as follows: a minimum of $12.6 million to the state colleges and universities, $7.7 million to Rutgers University, $4.3 million to the University of Medicine and Dentistry of New Jersey, $2.8 million to the New Jersey Institute of Technology, $12.6 million to the county colleges, $4.9 million to independent institutions with a public mission, and $5 million for interinstitutional connectivity. In addition, the fund provides $5 million to support interconnectivity among the higher education institutions.

TECHNOLOGY

■ *Garden State Network (GSN)*

The Garden State Network (GSN) is a statewide data network operated by the New Jersey Office of Telecommunications and Information Services (OTIS) to serve all agencies of the state government. GSN includes more than 25,000 nodes administered from a central network control center in West Trenton. Part of the mission of OTIS and the GSN has been to effectively use state government resources through consolidation of network operations. Significant cost savings have been achieved through this consolidation, competitive telecommunications contracts, and volume discounts. Although the GSN has not been a major provider of services to higher education, libraries, or school districts it recently initiated service to New Jersey Institute of Technology (NJIT) and Burlington County College (BCC). GSN provides a link to the NJIT/BCC Technology and Engineering Center where distance learning via compressed video transport is used to conduct of an A.S./B.S. dual admissions partnership.

■ *K-12*

The five year (1997 to 2002) Distance Learning Network Aid of more than $250 million is not intended to result in a single distance learning network or backbone system dependent on a single provider. The state will be served by multiple networks with high-speed voice, video, and data services. These multiple networks will enable schools to connect to libraries, higher education, government systems, military affairs, and other national, state, and local networks.

Guided by standards and protocol established through coordination of services among the coordinating councils for distance learning and statewide initiatives, these multiple networks will be interconnected to serve the educational community throughout the state. School districts will be able to proactively seek the most appropriate technological solution to their educational technology needs, from basic Internet service to Asynchronous Transfer Mode (ATM).

Of the seven county-wide Interactive Television Networks (ITV) in the state, six use Bell Atlantic service and Mercer County utilizes Comcast for its transport. The six countywide distance learning programs that deliver live, full-motion courses to students and teachers over fiber optic cable are Bergen, Morris, Hudson, Burlington, Union, and Somerset. One tri-county project links the vocational-technical schools in Warren, Morris, and Sussex. Overall, in New Jersey, there are more than 190 ITV classrooms in K-12 schools.

■ ***New Jersey Intercampus Network (NJIN)***

NJIN does not operate its own physical network, but provides a structure for sharing expertise among and between institutions. NJIN operates a server, managed by Rutgers University, which provides Internet connectivity and services such as electronic mail, file transfer, and World Wide Web access for member institutions. The server (PILOT.NJIN.NET) has proven especially beneficial to the faculty and staff of smaller colleges, which have not had their own connection to the Internet. The server is accessed through dial-up modems or Internet telnet service.

■ ***New Jersey Institute of Technology (NJIT)***

NJIT operates ACCESS/NJIT, a network that offers video and data communications for learners. Each ACCESS/NJIT course consists of two components: a telelecture conducted by NJIT's faculty or academic leaders, or an expert affiliated with another educational institution; and an electronic discussion. The discussion may take place via NJIT e-mail, NJIT Virtual Classroom, fax machines, voice mail systems, and the telephone. Virtual Classes produced by ACCESS/NJIT are delivered through ITFS linkages, satellite relay, cablecast, VHS tape circulation, and compressed video transmission.

■ ***New Jersey Network (NJN)***

The New Jersey Network operates four full power television transmitters, six low power TV translators, and four radio transmitters.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

New Jersey is a technologically rich state that is becoming even richer. Along with states like Texas, North Carolina, and California, New Jersey can pride itself on its national reputation in educational telecommunications and technology. Such a position does not take place overnight, however. For almost a decade, New Jersey has worked at developing the three critical ingredients necessary for success in educational technology: savvy leadership, willing business partners, and healthy funding for schools and institutions throughout the state. The result is widespread access to technology that educators in many other states can only envy.

NEW MEXICO

ACRONYMS AND NETWORKS

- CHE—Commission on Higher Education
- CIO—Chief Information Officer
- CTE—New Mexico Council on Technology in Education
- EDEN—Electronic Distance Education Network
- ELF—Extended learning Fund
- WGU—Western Governors University

EXECUTIVE SUMMARY OF THE STATE

The Department of Education works with councils, consortia, and state plans to initiate distance learning in New Mexico. The Consortium for Higher Education Communications and Computing Services (CHECS), the New Mexico Consortium for Academic Libraries, and the Electronic Distance Education Network (EDEN) are important players in the statewide plan to offer a free market for distance education. K-12 schools are provided distance education through five distance education networks operated by universities and with the collaboration between K-12 schools and postsecondary institutions. The Commission on Higher Education implements the policy for extended learning in the postsecondary education.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The Telecommunications Act of 1996 has had a positive effect on the state, allowing affordable transmission rates for dial-up access in remote areas. The state signed a statewide contract with MCI in July 1997 that eliminated connect charges for new installations. The Council on Technology and Education and the Commission on Higher Education have traditionally coordinated distance education planning. The Electronic Distance Education Network (EDEN) is a consortium of universities in New Mexico which has implemented a statewide video network to facilitate distance learning between institutions. In 1994 the Technology in Education Act established the Technology for Education fund and provides funding to K-12 districts to implement local technology plans, while the Extended Learning Fund (ELF) was established in 1995 for the development of distance learning in higher education.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Chief Information Officer***

The Chief Information Officer's position was created by legislation in 1996 to develop a state information architecture and associated policies, procedures, and standards; ensure compliance as necessary; provide guidance and assistance to agencies in developing annual IT plans; review and make recommendations for IT budget requests; create a broadly based Technical Advisory Committee; develop a state strategic plan for IT; and review and approve central support organization cost recovery rates for IT services. While the statute creating the CIO sunsetted on June 30, 1998, many of these functions continue through the Office of the Governor.

■ *Council on Technology in Education (CTE)*

The 1994 Technology in Education Act established a 17-member Council on Technology in Education. The council has four responsibilities. First, it advises the State Board of Education and the legislature regarding the establishment of appropriate educational technology standards, technology-enhanced curricula, instruction, appropriations for educational technology, and administrative resources and services for public schools. Second, the council advises, works with, and provides assistance to the State Department of Education to conduct periodic assessments of the needs for educational technology in the public school system, makes recommendations to the State Board of Education on how to meet those needs, and reviews school district technology plans and reports. Third, the council promotes the collaborative development and implementation of educational technologies, projects, and practices. Finally, the council develops and recommends to the State Board of Education a statewide plan to infuse educational technology into the public school system.

■ *Department of Education*

Within the Department of Education, the Educational Technology and Data Management Unit of the Accountability and Information Services Division coordinates the state's educational technology efforts. The unit has two major functions. First, working with the Council on Technology in Education, the unit facilitates a statewide planning process for integrating technology into the learning process, assists school districts to develop long-term strategic educational technology plans and, upon approval of plans, makes monetary distributions to school districts. The unit also oversees the New Mexico Technology Literacy Challenge Fund activities and promotes collaboration among government, business, educational organizations, and telecommunications entities.

■ *Commission on Higher Education (CHE)*

The Commission on Higher Education is the statutory coordinating board for the institutions of the state post-secondary education system. Through the Statewide Extended Learning Initiative establish by legislation in 1995, the CHE oversees, coordinates, and determines policy structures for extended learning in the postsecondary arena. The commission defines "extended learning" to include the full range of available and developing modes for bringing instruction to learners, including off campus courses (live instructor delivery, military base instruction, instructional television instruction, and computer conferencing) offered within New Mexico for resident academic credit. The commission has statutory responsibility for coordinating resource-sharing, collaboration, and standardization of extended learning among educational institutions. Specifically, the Commission is charged with: working to ensure access, efficiency, coordination, and accountability in the development and operation of such programs; making awards from the Extended Learning Fund, when funded; and reporting annually to the legislature and the governor on the status of extended learning programs and making recommendations on the funding level for such projects. The commission's Educational Programs Committee coordinates the expansion of extended learning programs.

■ ***New Mexico Association of Community Colleges***

The New Mexico Association of Community Colleges, formed in July 1995, is taking on the responsibility of coordinating distance learning activities for the 16 comprehensive community colleges, two outreach centers, and one military institute. The Association has formed a distance learning committee that will create a plan for the community colleges. The association's current focus is the need for professional development, especially for Internet-based distance learning, and on the need for more upper division and graduate level distance learning courses at the community colleges.

THE DRIVING FORCE

The availability of funds to support distance learning efforts is a critical factor in whether and how such initiatives develop in New Mexico, particularly in postsecondary institutions. There is an inherent disincentive for the delivery of distance vs. on-campus instruction in the funding formula for postsecondary institutions: extended services, which include distance education, generate only 50 percent to 60 percent of the income obtained from on-campus instruction. This funding mechanism also makes it difficult to foster cooperation among institutions, especially on the programmatic level.

THE PLANS

■ ***K-12***

Educational technology activities at the state level are guided by the 1994 state technology plan, the *Road Map to School Improvement*, which is undergoing revision. As the Council on Technology in Education (CTE) revises the plan, it will focus on developing content standards and the full integration of learning technologies to support Content Standards with Benchmarks. It will also focus on professional development, as well as interoperability standards. One of the primary planning goals is to integrate technology into each district of the state's *Education Plan for Student Success (EPSS)*, rather than continue to treat technology separately from other educational planning efforts. Each of New Mexico's 89 school districts now has an approved technology plan, as required under the 1994 Technology in Education Act.

With regard to distance education, the State Department of Education works closely with the Council on Higher Education in the development of EDEN, a distance learning network that jointly involves K-12 schools and postsecondary institutions in the state. Five other networks operated by the universities deliver distance education courses to and among K-

12 sites: New Mexico Highlands University, Western New Mexico University, Eastern New Mexico University, New Mexico State University, and Northern New Mexico Community College. All of the networks are interactive, with either two-way or one-way video. Another important technology and distance learning resource for schools in New Mexico is the frame relay network maintained by the National Guard. Through the National Guard's facilities, educators have access to desktop video conferencing.

The State Department of Education's professional development efforts in technology center on the Statewide Professional Development Initiative, which involves facilitators in 51 school districts who train other teachers in their areas. The initiative's Leadership Academy helps administrators understand critical issues about technology for education, so that informed decisions can be made. Through the Network of Champions, which is a technology administrative policy group that conducts a statewide technology conference and a distance education conference, educators in New Mexico share information about classroom applications and pedagogy.

■ ***E-rate***

School districts in New Mexico submitted applications for E-rate funding on their own. The SDE provided technical assistance, formed focus and discussion groups, and created links on its World Wide Web page to support schools' efforts.

■ ***Higher Education***

The 25 public postsecondary institutions in the state include six, four-year universities, three special institutions, and 16 two-year community colleges, vocational-technical institutes, and branch campuses. Although all postsecondary institutions participate in distance learning, not all institutions are providers.

In 1996, the CHE revised its funding regulations, whereby geographic service areas will be phased out over a five-year period. By 2002, a statewide free market for distance education will exist in New Mexico.

There are three significant statewide consortia involving higher education institutions. The Consortium for Higher Education Communications and Computing Services (CHECS) is comprised of computer directors from all postsecondary institutions. CHECS has created a shared data network across the state for postsecondary institutions, and allows some schools to have access to its network. Second, the New Mexico Consortium for Academic Libraries has established a statewide contract among the libraries to allow sharing of resources, which benefits distance learning students. The consortium has established a joint purchasing initiative for databases and other resources, and one member, the University of New Mexico General Library, is the Library Services Provider for WGU. Finally, the Electronic Distance Education Network (EDEN) provides instruction via satellite to schools and campuses.

Postsecondary institutions, especially community colleges, are also involved in regional cooperatives. Two, two-year colleges cooperate with public schools to share instructors and create shared resources among schools. The hub for the Lea County Distance Learning Consortium is located at New Mexico Junior College, while the other consortium is headquartered at Clovis Community College. The University of New Mexico, New Mexico Highlands University, and Northern New Mexico Community College have joined with K-12 schools to form a consortium known as the Northern Network for Improvement of Schools. As part of that initiative, 33 school districts receive science and enrichment courses via satellite.

Individual institutions have pursued their own initiatives. New Mexico State University (NMSU) has been particularly active in distance learning, primarily through the four, two-year campuses that are part of its system. NMSU offered nine distance learning courses in the spring of 1998 over its compressed video network, six courses through satellite, and two World Wide Web-based courses. NMSU offers a Master's of Engineering degree, while a bachelor's degree completion course in business administration is offered at its two-year schools via compressed video. NMSU also provides satellite distributed courses to the Boeing Corporation in Seattle.

The University of New Mexico offers 80 to 90 distance learning courses per semester, reaching approximately 1,000 students. Eastern New Mexico University (ENMU) also offers distance learning courses through a local ITFS network. With one of the state's most developed programs for distributing courses via the World Wide Web, ENMU has assumed a leadership role in the state's involvement in the Western Governors University.

■ *Public Broadcasting*

There are three independent public broadcasting stations in the state: KNME in Albuquerque, licensed to UNM and Albuquerque public schools; KRWG in Las Cruces, licensed to NMSU; and KENW in Portales, licensed to ENMU. Each of these stations independently makes programming decisions for a single broadcast channel, and does not provide distance learning distribution or local educational programming. As plans are made for their conversion to digital television, the three stations may collaborate for shared delivery in the future. KNME has taken a bold step forward in the planning phase of the conversion process by conducting 11 focus groups with teachers in K-12 and higher education. The focus groups have provided a means to access educator's perceptions and understanding of digital television as well as their potential use of the digital television if it were made available. Findings from these and additional focus groups will be used to develop a platform for distributing educational services via digital television in eduactional settings.

THE FUNDING SOURCES

■ K-12

New Mexico received $1.6 million in Technology Literacy Challenge Funds during the 1997-98 school year, and $3.6 million in the second round of grants. The awards targeted advancing school district *Educational Plans for Student Success (EPSS)* through the integration of learning technologies in support of enhanced teaching and learning.

The Technology for Education fund, originally established in 1994 under the Technology in Education Act, has appropriated $4.4 million for school districts' technology related efforts, to be spent in accordance with their approved plan. This per student funding allocation has grown from $9 per student in 1995 to over $14 per student in 1998. An additional $1 million has been allocated by the legislature to support the Educational Technology Opportunities Program, Computers in the Schools Program, a partnership involving the Governor's Office, State Department of Education, New Mexico Technet, and Intel to prepare multimedia computers for schools. Approximately 10,000 units will be made available to schools.

■ Higher Education

Three streams of funding exist at the state level for New Mexico's higher education distance learning projects. First, recurring operational costs are supported through a funding formula. In addition, non-recurring project funding is available via special project requests and through the Extended Learning Fund (ELF). During 1997, the Commission on Higher Education received and evaluated institution proposals for support from the Extended Learning Fund (ELF) totaling nearly $11 million. The commission recommended eight projects to the legislature, for a total request of $4.8 million. The ELF was created as part of the 1995 state wide Extended Learning Initiative and to date has never received an appropriation.

TECHNOLOGY

■ Higher Education

There is significant extended learning (distance education) activity in public postsecondary education in New Mexico. All public colleges and universities are utilizing educational telecommunications related to their mission(s) to either provide or receive instructional offerings. Seven colleges and universities are using extended learning to provide concurrent high school instruction, and the University of New Mexico is involved in telemedicine. Off-campus educational opportunities are available in over 70 New Mexico communities and in all 33 counties. A broad range of technologies are used to provide these services, including video-based (one-way microwave and satellite delivery, and two-way videoconferencing) as well as computing, data, Internet, and web-based connections.

EDEN is a satellite and compressed video network, run as a consortium of all six, four-year institutions in the state and some community colleges. The satellite has three digital channels, two C-band (Wagner MPEG1) and one Ku-band (CLI). There are 60 to 70 receive sites for each band throughout the state. EDEN has a shared network design and operation, with limited shared program development. The video network has about 15 sites throughout the state. The compressed video network runs on one-quarter T-1 transmission rates using a combination of CLI and PictureTel technologies, as well as a combination of dedicated T-1 and dial-up connections through the two MCUs in the state.

CHECS-NET is a data network that capitalizes on the frame relay service. Compressed video is not run over this network. CHECS-NET uses dedicated T-1 connections. All connections are distance insensitive, as the cost of leased lines to the farthest frame relay access point are absorbed by the aggregate costs of all members. The network monitoring, service contracting, and purchase of bandwidth, are all taken care of by the non-profit corporation. The operations are housed at NMSU.

The University of New Mexico operates an eight-channel ITFS system and also distributes courses through two satellite uplinks and two-way compressed video via EDEN. New Mexico Highlands University has a C-uplink, and New Mexico State University has a KU-uplink. NMSU is piloting the use of dial-up ISDN videoconferencing on system, which includes its main campus and four community college campuses.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Support for distance education and educational technology efforts is derived primarily from the legislature, and in theory, is quite strong. The reality of the situation in New Mexico, however, is that there are other more pressing needs that must be addressed, such as welfare and corrections. New Mexico is ranked 46th in terms of per capita income level for all states, and has the highest number of households without telephone service. There are also technological infrastructure problems that inhibit growth in education via telecommunications; there are some 15 independent telephone companies serving the state. Many of the telephone companies are small, and combined with the rural nature of the state, it makes it difficult to bring state-of-the-art communications infrastructure into some of the areas. There is also no statewide telecommunications infrastructure. In addition, the FTE funding mechanism in NM makes it difficult to foster cooperation among institutions, especially on the programmatic level. Given the lack of state support for infrastructure at the higher education institutions, the institutions have needed to find creative ways of coming up with the services that are needed.

NEW YORK

ACRONYMS AND NETWORKS

- BOR—Board of Regents
- SED—State Education Department
- SUNY—State University System of New York

EXECUTIVE SUMMARY OF THE STATE

Like other highly populous states, New York had experienced difficulties coordinating its educational technology initiatives. Very recently, though, an infusion of leadership and funding has enabled the state to regain a lead position among the states. Historically, technology initiatives have been grass-roots events, focused on the local level. Now there is evidence of statewide planning and achievement of technology goals. One statewide initiative involving K-12 schools is the Electronic Learning Community, a project that aims to provide schools with access to two-way, broadband Internet connections over a five-year period. In higher education, SUNY is in the midst of implementing its multi-year Educational Technology Initiative, which will infuse technology into the learning and teaching efforts taking place on all 64 campuses. The 1997 organization of the state Office of Technology, which reports directly to the governor, may help to consolidate educational planning efforts with other government agency telecommunications projects in the state.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Centralized policy and planning for distance education and telecommunications has not been a part of New York's history until recently. K-12 schools and higher education institutions had developed their own alliances to fulfill their own needs, with some impressive local technology infrastructures resulting from these efforts. Consistent commitment to developing the state's educational technology resources had been lacking from the state's past governors and state legislatures. With a distinct upstate-downstate separation, New York has just begun to discover common ground for statewide educational technology and telecommunications planning.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/ EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Office for Technology (NYT)***

The Office for Technology was initially formed as the Governor's Task Force on Information Resource Management in January of 1996. In July of 1997, the Office for Technology was formally established to coordinate New York State's technology resources. Three goals guide the office's efforts: to save state resources, increase interagency and inter-governmental communication, and improve citizen and private sector access to New York State government. The office includes an advisory council of interested information resource management executives, as well as a staff of twenty members, most of whom are on loan from their respective state agencies. All of the office's tasks are accomplished through work groups, councils and leadership cadres. The office reports to the Director of State Operations.

The Office for Technology currently has little direct involvement in distance learning in New York State. At this early stage of its development, NYT has not yet begun to work with state departments and education to facilitate acquisition of telecommunications transport facilities.

■ ***Board of Regents (BOR)***

The Board of Regents is responsible for the general supervision of all educational activities within New York and preside over the State University (SUNY) system and the New York State Education Department (SED). The 16-member Regents are elected for five-year terms by the state legislature and are organized into standing committees and subcommittees whose members and the chancellor appoints chairs. Although the Board of Regents establishes broad policies, institutions of higher education are free to forge their own distance learning and educational technology programs. With regard to K-12 schools, the BOR has encouraged schools to establish their own connections and partnerships, but it has also exerted leadership in the development of the learning technology infrastructure of the state.

■ ***State University System of New York (SUNY)***

The SUNY system includes 64 campuses and operates two major statewide telecommunications networks, SUNYNet and the New York Network/SUNYSAT. Within SUNY, Advanced Learning and Information Services (ALIS) coordinates the technology planning and distance learning initiatives taking place across the system's campuses. Advanced Learning and Information Services, SUNYNet, and the New York Network are all located in SUNY's Office of the Provost. Another key entity within SUNY is the Distance Learning Advisory Panel, which works to identify issues related to distance learning and makes recommendations to SUNY's Chancellor. Within ALIS resides the SUNY Learning Network, a growing force in distance learning in the state.

THE DRIVING FORCE

New York's main strength in developing distance learning and educational technology programs has been located in the activities of regional consortia. Pockets of activity have sprung up across the state as educators realize the potential technology offers. Although these regional projects have not sparked large scale programs and initiatives, many of them have experienced considerable success.

THE PLANS

■ ***Office for Technology/Governor's Task Force on Information Resource Management***

In November of 1996, the Governor's Task Force on Information Resource Management, which has since been reorganized as the Office for Technology, released its Strategy for the Future. The document identified a five-point agenda to guide the state's technology planning over the next five years. First, the Office for Technology is focusing on statewide policy and direction by establishing technology policies in such areas as data exchange, the Internet, security, technology standards, electronic imaging, and use of social security numbers. Second, the office directly participates in projects with statewide or multi-agency implications, such as projects dealing with telecommuting, "best practices," and Year 2000 date change. Third, the office encourages data partnering among agencies to reduce duplication of effort. Fourth, the office coordinates the state's technology purchasing. Finally, the office is working to create a statewide IP voice, data, and video network to link all state and local government offices.

The state Office of Technology also coordinates the NYT (pronounced "Net") project. NYT will serve the administrative needs of the Office of General Services and state and local agencies through a 15-member governing body. Eight strands of fiber have been acquired for operational use by the state through an agreement with MFS Technologies, which has recently installed a high bandwidth pipeline along the New York Thruway. Some of the bandwidth will be dedicated to educational purposes.

■ ***Board of Regents***

The Board of Regents' Task Force for Infrastructure and Technology is reviewing issues related to the use of technology in education, as well as issues related to the development and improvement of infrastructure, planning, and curriculum development. A standing Statewide Advisory Committee on Technology has also been working to support the BOR in its decision making. The committee's first priority has been developing a planning document and recommendations for funding.

■ ***K-12***

The Board of Regents has taken steps to ensure that technology capacity development is directly associated with supporting the attainment of the new, higher standards of learning. As a matter of policy, the Regents have identified technology and telecommunications infrastructure development (including the development of the human capacity for using these technologies) as a major strategy for achieving the new goals set for learning, teaching, and information access. The Regents have also adopted as an operational construct for the establishment of the technology infrastructure the creation of New York State's Electronic Learning Community. All institutions operating under the Regents Charter of the University of the State of New York (all public and nonpublic K-12 institutions, colleges and universities, libraries, cultural institutions)—over 12,000 in all—will be interconnected with high speed telecommunications connections to ensure access to quality learning resources and allow the sharing of knowledge and expertise for all learners.

K-12 schools in New York state are in the midst of implementing a five-year, electronic learning community project initiated through a series of legislative actions beginning in

1996. The projects establish new fiscal resources that were necessary to develop a statewide electronic community for learning, teaching, research, and information access. The project provides for the essential components of the electronic learning environment: long-term funding to support network infrastructure; a financing plan to provide equitable access to all of the state's educational resources, with a special emphasis on those institutions with the least ability to pay; in-service training for all education and research professionals; development of technology-rich applications that will support the restructuring of the design and delivery of educational opportunity where technology is infused in every part of the curricula; and a framework for the joint management and support of the network and its resources by all members of the state's education and research communities. By the end of the Electronic Learning Community's five-year period, nearly 7,000 schools will have access to two-way, interactive broadband connections to the Internet and other broadband networks.

All New York State schools are involved with the development of a five-year comprehensive educational plan, which includes an instructional technology component. The instructional technology component consists of information concerning hardware acquisition and wiring, training, funding. technology applications, and modeling new uses of technology through demonstrations.

The New York Wired for Education program began in 1996 as an initiative stemming from Governor Pataki's office. As part of this effort, schools and libraries throughout the state received Internet wiring kits free of charge, and thousands of volunteers, including business executives, labor union members, parents, teachers and interested citizens, installed the kits at a cost savings of over $20 million. The New York State Lottery provided start up funds for administration of the program. In 1997, the Wiring for Education program began another phase, with the establishment of the New York Wired Educational Solutions Center in Albany. The center will be used by school districts from across the state to learn about state-of-the-art classroom technology, and to develop plans for incorporating technology into local schools.

Most K-12 distance learning activities are initiated through local BOCES (Board of Cooperative Educational Services) or school districts. Approximately one-half of all BOCES have established or participate in local distance learning networks. For example, three BOCEs districts in Western New York have established a combined distance learning network to connect more than 56 sites. Six BOCES also function as Regional Information Centers (RICs) and provide data services and Internet access to schools in 100 school districts. The Long Island Educational Enterprise combines three BOCES districts, all Nassau and Suffolk County schools and libraries, and the New York Institute for Technology (NYIT). In this project, K-12 schools serve as testbeds for NYIT's efforts to develop methods, teaching standards, and curricula. The state houses other local technology initiatives, including the Rochester Area Interactive Telecommunications Network (RAITN) and the Southern Tier Telecom 5.

■ ***E-rate***

The School Education Department has contributed to schools' preparation for E-rate applications in several ways. SED has provided technological assistance and information sharing, conducted three regional information briefings, created a handbook, and serves as the approval agency for school technology plans. The SED perceives the E-rate as one means to achieve the goals of its Omnibus Technology project to connect all schools to the Internet.

■ ***Higher Education***

The State University of New York (SUNY) is aggressively pursuing the coordination of telecommunications to enhance distance learning among its 64 campuses. Through its multi-year Educational Technology Initiative (ETI), SUNY will provide increased access to Internet and other technologies to its students and faculties. Two immediate objectives of the initiative are to increase faculty access to and use of appropriate technology for instruction, research, and scholarship, and to accelerate and expand the development of the University's technology infrastructure to better meet the challenges of the information age. The "New Dimensions" Faculty Development Program, part of SUNY's ETI targets needs expressed by SUNY's academic community for professional development and training in the uses of educational technology. The New Dimensions program includes a variety of seminars, workshops, and teleconferences in three key technology areas: Instructional Multimedia, Web-based Instruction, and Distance Learning.

SUNY's Training Center (formerly the Center for Professional Development in Technology), located in Syracuse, facilitates the positive uses of technology in SUNY's on-going transformation by ensuring that SUNY's human resources have access to the training and professional development necessary to effectively maintain, use, support, and advance SUNY as a productive system of higher education.

■ ***SUNY Learning Network***

The Learning Network has expanded from eight to 37 campuses. There are nearly 500 distance learning courses planned for the 1998-99 academic year, while the number of students expected to enroll is nearly 6,000. All courses are asynchronously delivered over the Internet. SUNY's Office of Library and Information Services will be creating a virtual library for students.

■ ***New York State Educational Research Network (NYSERNet)***

NYSERNet, a consortium of leading New York State research and educational institutions that provides network connectivity, sponsors a number of projects. Among NYSERNet's activities is NYSERNet 2000, which will build an evolving, broadband testbed network for the trial and provision of network-based technological innovations in support of the research and educational communities. NYSERNet also coordinates the TIPS (Technology Information and Planning Site) program, which is designed to help state K-12 schools, and the library and museum community to understand and take advantage of a wide range of technology initiatives. NYSERNet received NSF funding in 1997 to support its CAI Wireless Internet Connectivity Trial. As part of this initiative, NYSERNet is partnering with CAI Wireless Systems, Inc., to conduct a trial using Multichannel Multipoint Distribution Service (MMDS) as an innovative Internet delivery system with 10 public service organizations.

THE FUNDING SOURCES

■ *K-12*

The Omnibus Technology in Education Bill of 1996 was designed to provide schools with a number of grants to support infrastructure, professional development, building construction, and collaborative planning. The bill did not pass, but many of the goals were achieved through other funding programs, and legislation development continues to be coordinated within the shell created in the original initiative. Due in large part to the leadership and advocacy of the Regents and the Commissioner of Education, New York State Education Department in 1998 experienced one of the most successful legislative sessions in history with respect to technology and program issues.

The Electronic Learning Community Connectivity Initiative awards grants to telecommunications providers for services and expenses related to the establishment and maintenance of two-way, interactive broadband connections to the Internet and other broadband networks for all eligible public and nonpublic K-12 schools, colleges and universities, libraries, and other entities.

Funds for connections flow to the telecommunications providers via the state's ten Economic Development Regions, and apply to the annual telecommunications costs, not infrastructure or equipment costs. The state's share of these costs decreases 10 percent every year until year six, at which time state and local contributions will be shared equally at 50 percent.

The High Cost Connectivity Fund is a reserve fund that provides, if necessary, support for the connection of specific institutions to broadband telecommunications networks where there are connectivity limitations caused by an inadequate telecommunications infrastructure. The fund was created to cover additional connection costs for those institutions in economically depressed or rural areas where the physical infrastructure cannot support the new connections of sufficient capacity.

The Professional Development Fund helps finance in-service training in the use of telecommunications and related information technologies for teachers, librarians, and other education professionals. The program supplements local staff development programs. No school is able to receive connectivity grants unless it has a training plan in place.

Technology Aid for Computer Hardware, Software, and other Equipment for Networking provide one-time funds for the acquisition of facility-level telecommunications equipment, cabling, and workstations with an initial capacity that would give these institutions full Internet access, including the ability to run multimedia applications.

Building Aid for Technology and Telecommunications Network Infrastructure Development for Schools, Libraries and Library Systems, and Cultural Institutions allows K-12 schools to use building aid for the purchase of such networking equipment and computer hardware for all classrooms, school library media centers and other school facilities, as appropriate, without any restriction with respect to computer lab configuration. Unlike the Technology Aid program, the Building Aid provisions permit the use of existing funds to develop the overall infrastructure of the premise as opposed to the initial network connection point. A separate aid category was established to provide supplemental support to elementary and secondary schools that have a demonstrable need for additional capital construction funding.

Regional Technology Study Grants support the development of long-range technology planning and telecommunications network development within economic development regions. These funds support initial planning efforts on the part of all educational institutions in a region to coordinate educational programs and develop new applications such as distance learning.

With regard to federal funds, in 1998, New York State's schools and BOCES received more than $22.8 million in grants to as part of the federal Goals 2000 initiative. A total of 69 school districts and BOCES were awarded grants ranging from $33,000 to $7.6 million (for New York City schools). School districts and BOCES will collaborate with schools, colleges, universities, community organizations, and businesses to implement the state's learning standards, develop high local standards, develop new assessments, and provide training activities to teachers, parents, and staff. The Goals 2000 grants supported technology projects in three areas: professional development, local improvement planning and implementation, and preservice teacher education.

■ ***Higher Education***

The SUNY Learning Network has received a competitive grant of $1.3 million through the Alfred P. Sloan Foundation. The award will support the network's continued development during 1998-99.

TECHNOLOGY

■ ***SUNYNET***

SUNY connects its campus community colleges with each other and its System Administration through SUNYNET, a T-1 network. The SUNYNet Backbone is made up six hub locations (University at Buffalo, University at Binghamton, Health Science Center at Syracuse, Health Science Center at Brooklyn, College at New Paltz, and SUNY Central Administration) connected by dual T-1 rings. Frame Relay is now in use in all areas of SUNYNet.

- ***New York Network (NYN)***

NYN is a video gateway for news and all state agencies. NYN provides access for local media as well as closed circuit video conferencing, and is a producer of instructional programming for K-12 schools, higher education, and state agency training. NYN produces and transmits video over the SUNYSAT system. NYN's goal is to broadcast educational programming on a full time basis.

The New York Network/SUNYSAT infrastructure consists of a primary, fully redundant uplink in Albany, and more than 300 downlinks at SUNY campuses, county offices, state agencies, Cornell Cooperative Extension offices, and some BOCES and school districts. Many of the sites have dedicated downlinks. The network was recently converted to DBS for compatibility with downlink analog transmissions.

- ***NYSERNET***

NYSERNET is an Internet service provider for educational and research institutions. NYSERNet uses T-3 as the backbone for deploying services for Internet access. Currently, NYSERNet is in the process of partnering with vendors to initiate the NYSERNet 2000 project. In June 8, 1998, Newbridge Networks and NYSERNet announced that an alliance for new networking technologies. Newbridge will supply the broadband ATM network switching solution for NYSERNet.

OTHER PROGRAMS

New York state is home to many private universities which are undertaking distance learning initiatives. New York University is one of the first of the Sloan Foundation's Asynchronous Learning Network (ALN) projects. Rensselaer offers its RSVP program, a distance learning development and brokering service, to individuals and corporations nationwide. Cornell's Institute of Labor Relations is leading that university's entry into a broad-based distance learning effort. Rochester Institute of Technology has a long-standing distance learning program, particularly in engineering.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

New York State takes its turns at national leadership in educational technology. Through the mid-'80s, the Center for Learning Technologies in the State Education Department offered innovative services. After years of lackluster and uncoordinated development of technology and telecommunications services, the governor and the Board of Regents have advanced new, ambitious plans—and funds for implementing the plans. The SUNY Learning

Network not only is providing a rapidly growing distance learning service to the entire state, but also, as a byproduct, is building links for improved technology and programmatic coordination among the 64 campuses that comprise the SUNY system.

NORTH CAROLINA

ACRONYMS AND NETWORKS

- DPI—Department of Public Instruction
- IRMC—Information Resources Management Commission
- NCIH—North Carolina Information Highway
- NCIIN—North Carolina Integrated Information Network
- NC-REN—North Carolina Research and Education Network

EXECUTIVE SUMMARY OF THE STATE

The North Carolina Information Highway now connects 137 sites, including 23 community colleges and 52 high schools in the state. Within the Department of Public Instruction, Information and Technology Services (ITS) is working to implement the recommendations identified in its January *1998 Strategic Information Technology Implementation Plan (SITIP)*. The DPI is also carrying out professional development as part of the information technology competencies for teachers articulated by the School Technology Users Task Force and approved by the State Board of Education in 1996. The state's community colleges continue to use distance learning, especially video-based programming carried over the North Carolina Television Network. Public universities, private universities, and private colleges throughout the state participate in independently planned distance learning initiatives that employ a number of technologies. The independent projects undertaken by North Carolina's education community may become more coordinated through the work of the state's Education Cabinet. In mid-1997, the Education Cabinet completed a study of barriers to collaborative distance learning planning in North Carolina, and issued a series of recommendations for removing the obstacles.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The state of North Carolina's Integrated Information Network (NCIIN) is a conglomeration of interoperable networks capable of transmitting data, text, images, voice, and video to provide services for education, health, medicine, criminal justice, economic development, and government operations. The North Carolina Information Highway (NCIH) is NCIIN's all fiber, all digital, high speed network using ATM switching technology and SONET transport to deliver broadband services. The NCIH began as the Vision Carolina pilot program in 1992-94, a regional partnership among public schools, community colleges, and universities in the Wilmington and Charlotte areas.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Education Cabinet***

Governor Jim Hunt created the Education Cabinet in 1992. The governor acts as the cabinet's chair, and the cabinet includes members from the North Carolina Department of Public

Instruction, Community College System, University of North Carolina, as well as members from the North Carolina Association of Independent Colleges and Universities. Because of the frequent meetings, the Education Cabinet has been able to advocate for a more integrated approach to planning, including planning for an integrated distance learning program.

■ ***Information Resources Management Commission (IRMC)***

The 19-member IRMC is responsible for formulating state-level technology strategies, plans, policies, and procedures. Among the IRMC's duties, it must annually update a statewide information technology strategy, develop and report on statewide technology initiatives, review technology plans of executive branch agencies, and recommend information technology priorities to the governor and Office of State Budget and Management. The IRMC is housed within the Information Technology Services Division of the Office of the State Controller.

■ ***Information Resources Management Division (IRM)***

The IRM Division manages information technology and telecommunications resources on behalf of the state, and assists the Information Resources Management Commission (IRMC) as it crafts its information technology plans. Working with state agencies, federal and local governments, private citizens, and private sector businesses, the division helps implement new technologies consistent with the directions of the IRMC.

■ ***State Information Processing Services (SIPS)***

SIPS is responsible for operational management of the information technology activities within state government. SIPS provides information technology services to state agencies in the areas of information processing, telecommunications, systems development, and technology training.

■ ***Department of Public Instruction (DPI)***

Within the Department of Public Instruction, the recently reorganized Information and Technology Services (ITS) provides administrative, instructional, and networking technologies support to school systems across the state. The Applications Development Division focuses on development and support. The Network Technology Division focuses on operations, customer support, forecasting, and evaluation. Educational Technology Programs maintains responsibility for local planning support, distance learning, instructional resources evaluations, and the implementation of the Student Information and Accountability System (SIAS) project.

■ ***Community College System***

The State Board for Community Colleges formulates curriculum standards, accountability, manages centralized information, and distributes funding on behalf of the state's 59 community colleges. North Carolina's community colleges are each governed by an independent Board of Trustees, with each president reporting to that Board. The community college system is considering greater collaboration among community colleges as well as with the state's universities and K-12 education system. To this end, representatives from the community college system collaborate with the state Department of Education, university system, and the association of private colleges and universities on the Education Cabinet. The community college system's ad hoc Distance Learning Council addresses collaboration, policies, and procedures for distance learning.

■ ***University of North Carolina (UNC)***

The sixteen campuses of the University of North Carolina system make extensive use of technologies supporting the areas of voice, data, and video communications. However, the University of North Carolina does not have a coordinating body or a committee initiating policies to implement a system-wide distance education. The University of North Carolina's General Administration is in the planning stage of meeting with the Board of Governors and the administrators to establish a coordinating board for the purpose of creating a single distance education system for the sixteen campuses of North Carolina..

THE DRIVING FORCE

The active and prolonged involvement of Governor Jim Hunt has contributed significantly to North Carolina's ability to centralize its technology and telecommunications planning. Governor Hunt served two terms from 1976 to 1984, and was elected again in 1992 and 1996. His long-term dedication to improving the state's infrastructure and his interest in education (he chairs the national Goals 2000 committee) has fueled the state's concerted effort to increase educators' access to information technology.

THE PLANS

■ ***North Carolina Information Highway (NCIH)***

The NCIH serves two purposes in education: it provides the backbone for aggregated voice, data, and video transmission, and it wires the schools to have access to this infrastructure. Approximately one-third of the schools in the state have a high speed Internet connection through the NCIH. The change in NCIH's platform to a compressed video standard H.320 and the associated reductions in monthly charges will allow more schools to afford the technology.

■ ***Education Cabinet***

House Bill 53 from the 1995 session instructed the Education Cabinet to study ways to eliminate barriers to cooperation among public schools, community colleges, and universities in the area of distance learning. The Education Cabinet responded by creating a Task Force of representatives from public schools, the North Carolina Community College System, the University of North Carolina, the North Carolina Association of Independent Colleges and Universities, and the Governor's office. In July 1997 the task force released its report on the removal of barriers. The document outlined three key recommendations that would lead to greater opportunities for distance learning collaboration. First, the task force recommended that the North Carolina Community College System, the University of North Carolina, and the North Carolina Association of Independent Colleges and Universities consult with one another before adopting their respective distance learning policies, to ensure compatibility. Second, the task force recommended that the Education Cabinet develop sector-wide collaboratives within the postsecondary sectors and among the public high schools. The task force's final recommendation was that the Education Cabinet investigate the possibility of establishing a single, statewide entity which would collect, organize, and make accessible postsecondary distance learning resources from across the state.

■ ***K-12***

In January 1998, the Information and Technology Services (ITS) unit of the Department of Public Instruction (DPI) published its *Strategic Information Technology Implementation Plan (SITIP)* to reduce duplicated efforts and coordinate plans for improving information technology in the state's education community. The SITIP built on several education initiatives. In 1995, the School Technology Commission, an organization independent of DPI, developed the *North Carolina Instructional Technology Plan (ITP)*. The plan identified ways to improve student performance in the public schools through the use of learning and instructional management technologies, and required each school to develop a technology plan. Also in 1995, the North Carolina General Assembly passed the *ABC's of Public Education*, the state's comprehensive plan to improve North Carolina public schools, which focused on accountability, basic skill development, and increased local control over educational decisions.

The SITIP identified four strategic priorities that the State Board of Education (SBE) and DPI had targeted in their prior planning initiatives: high student performance; safe and orderly schools; quality teachers, administrators and staff; and efficient and effective operations. The SITIP emphasized that information sharing through compatibility and connectivity is the best means to promote education. To this end, ITS intends to create standards for schools and district Local Education Agencies (LEAs) within the context of the North Carolina's statewide architecture. The SITIP identified five priorities for selecting projects to undertake: the Student Information and Accountability System (SIAS), Year 2000, local technology plan development and implementation, Local Area Network/Wide Area Network for district LEAas and public schools, and salary certification. ITS plans to update the SITIP on a quarterly basis.

North Carolina is one of several states that require instructional technology competencies in pre-service teachers. The School Technology Users Task Force, a group of K-12 educators, community college representatives, and university staff, was assembled in 1995 to establish the necessary framework to enable the universities, community colleges, and public schools to work together to meet the technology professional development needs of K-12 educators. The basic and advanced technology competencies were introduced in the School Technology Users Task Force's October, 1995 report. In March 1996, the North Carolina State Board of Education approved the competencies for all North Carolina educators (inservice) as part of the five-year cycle for license renewal, and later approved a framework for developing and implementing assessments of essential and advanced technology skills in preservice teachers in the state's schools of education

Many of North Carolina's schools are wired for technology. Eighty-two percent of schools have Internet connections, while 100 percent of Local Education Areas have Internet connections. The schools have access to the Internet through the state's NCIH, commercial providers, and other means such as through dial up, dedicated connections, or universities.

A number of schools in the state participate in the North Carolina Learning by Satellite Network, an initiative established by the General Assembly in 1988 and Star Schools recipients. The network provides an expanded curriculum to students in small, rural high schools and provides staff development opportunities to teachers, administrators, and support staff in all school districts. During the 1996-97 school year, there were 220 installed sites, which enabled more than 1,000 students to take 20 courses in advanced mathematics, science, and foreign languages. In addition, the network distributed over 100 hours of staff development programming.

■ ***E-rate***

The Department of Education has provided information and assistance to schools and school districts for E-rate applications, and has relied on the NCIH to educate school officials and teachers. SIPS will write a statewide application for the NCIH.

■ ***Community College System***

North Carolina's community colleges have been offering telecourses since 1975, and currently enroll more than 10,000 students per year in several hundred telecourses, many of which are offered through PBS. Sixteen community colleges also committed to offering an associate's degree via distance learning, and are awaiting accreditation. There are also 22 interactive video sites on the NCIH located at community colleges. The community colleges are developing asynchronous delivered courses, as well as IP video projects.

■ ***Higher Education***

Among the 16 campuses of the University of North Carolina System, there is no systemwide coordination of distance learning programs. Instead, each institution plans and maintains its own distance learning initiative. Nevertheless, systemwide coordination is in the planning stages. Current issues that need to be addressed include a coordinated effort to participate in the Southern Regional Electronic Campus, accreditation of programs, and a long standing law barring legislative appropriations for distance learning.

All of the state's 16 public universities are NC-REN sites and/or NCIH sites. Many of these institutions, as well as the state's 37 private colleges and universities, pursue distance learning. For example, North Carolina State University is a charter member of the National Technological University. Appalachian State University has been involved for years in a cooperative project with AT&T, Southern Bell, and public schools in the northwest region on the state. East Carolina University has proactively developed Internet-based courses.

THE FUNDING SOURCES

■ *North Carolina Information Highway (NCIH)*

Funding for the NCIH in 1996-97 was $5.3 million, a figure that is expected to stay constant over the next several years. Much of the allocation supports monthly site charges. Capital expenditures for expanding the network were funded by grants of up to $100,000 in the network's initial stages, and are currently funded through other grant procurements. The $5.3 million anticipated in 1998-99 may partially support the network's migration.

■ *K-12*

The Department of Public Instruction distributed $3.7 million in Technology Literacy Challenge Fund grants at the end of 1997. In August 1998, the DPI released an additional $7.6 million in the second year of the TLCF. The focus for the North Carolina Technology Literacy Challenge Fund sub-grants is on developing innovative, effective, and replicable models for further implementing existing instructional technology plans, in keeping with the *North Carolina Instructional Technology Plan* and four national technology goals. At least one-half of the $7.6 million was appropriated to school districts with 20 percent or more of children living in poverty. The TLCF funds will enable the addition of seven sites to the interactive video network through the NCIH.

The Department of Public Instruction received Star Schools funding to support its Distance Learning by Satellite Network. North Carolina will receive $300,000 per year for an additional 5-year period.

TECHNOLOGY

■ *North Carolina Information Highway (NCIH)*

The NCIH, a SONET/ATM broadband network delivering two-way interactive video and advanced data communications services, includes 137 sites. Much of NCIH's funding pays for transmission charges on the 155 Mbps OC-3 site connections that provide full motion video and cost $4,000 for 30 hours of use per month for each site. The site connections will be downscaled to DS-1, using H.320 as a standard and transmitting video at 768 Kbps. The remaining bandwidth will be used for data. The downscaling will result in a reduction in monthly transmission costs, perhaps by as much as 50 percent.

ANCHORNET is a WAN service offered by the statewide infrastructure as part of the NCIIN. The service offers 56/64 Kb dedicated lines at $550 per month to clients including state agencies and county government offices, with increasing bandwidth available at an increasing price.

■ ***Higher Education***

The North Carolina Research and Education Network (NC-REN) is a private telecommunications network interconnecting universities, medical centers, research institutions, and graduate centers in North Carolina. It is installed and operated by the Microelectronics Center of North Carolina (MCNC) Information Technologies Division. With interactive, multi-way, face-to-face video and audio communication, the NC-REN Video Network currently links 19 sites with multiple channels for credit courses, videoconferences, seminars, training programs, and economic development. The network interfaces with the NCIH.

■ ***University of North Carolina Television Network***

The UNC Television statewide network, headquartered at the Bryan Communication Center of Research at UNC-Triangle Park, works closely with the state's community college system and other higher education institutions to provide college credit telecourses and adult basic learning programming. Currently, 52 two- and four-year colleges provide for-credit telecourses for more than 12,000 students in the state. In a cooperative project involving the Department of Public Instruction, UNC Television also provides airtime for "School Television."

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

North Carolina was one of the first states to dedicate considerable resources for developing a statewide, high bandwidth network for use by state government, education, health, economic development, and criminal justice. One of the lessons the state has learned is that such an undertaking does not immediately benefit all interested parties. NCIIN's expansion over the past two years (from 132 sites in 1996 to 137 at the present) is modest, at best. One of the primary reasons for the slow expansion relates to the network's cost, which has been a prohibitive factor especially for community colleges and K-12 schools, and the network's migration to DS-1. With the lower transmission costs, community colleges and schools will be better able to afford to participate. Including the education community is a priority for the NCIH. Over the next several years, the NCIH will make efforts to connect all community colleges (currently, 23 of the 59 community colleges are connected to the NCIH), both to completely include one user group on the system and to establish sites within a 30 minute drive of any location in the state. The next priority will be connecting high schools.

The biggest obstacle to the use of the network is the funding question. The infrastructure has been established in such a way that necessary bandwidth for any agency or institution can be obtained through SIPS/STS. STS has taken a lead in showing the possibilities of technology to the schools. Now they would like to see the organizations take responsibility for themselves both in acquiring the necessary equipment as well as in lobbying for funding.

NORTH DAKOTA

ACRONYMS AND NETWORKS

- HECN—Higher Education Computing Network
- ISD—Information Services Division
- IVN—Interactive Video Network
- ND ETC—North Dakota Educational Telecommunications Council
- NDUS—North Dakota University System
- ODIN—Online Dakota Information Network

EXECUTIVE SUMMARY OF THE STATE

North Dakota's independently planned K-12 technology efforts and regional video clusters will benefit from approximately $5 million in combined state and federal funds, which will be administered through the North Dakota Educational Telecommunications Council. In higher education, the North Dakota University System is working to bring together the distance education planning activities taking place on its campuses as it carries out the recommendations made in its six-year Strategic Plan 1998-2004 and coordinates programming on its IVN. Minot State University continues to develop its virtual university, MSUOnline, and the Prairie Public Broadcast Network anticipates taking on a new role as a delivery mechanism for broadband services.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The North Dakota University System's Interactive Video Network (IVN) is a digital compressed video network that connects all 11 campuses of NDUS. IVN has been the most popular type of technology used for delivering degree programs. In addition, IVN has also been interconnected with several K-12 interactive video clusters. The North Dakota Higher Education Computing Network (HECN) has hosts for administrative computing as well as mainframe computing and networking. The North Dakota Educational Telecommunications Council had previously completed a needs assessment that made recommendations on the role of divisions like the Information Services Division (ISD).

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Information Services Division (ISD)***

The Information Services Division provides data processing, records management, and telecommunications, including equipment and telephone services, to state agencies. ISD cooperates with the North Dakota University System in operating the North Dakota Interactive Video Network (IVN) and the North Dakota Information Network (NDIN).

- ***North Dakota Educational Telecommunications Council (ND ETC)***

The North Dakota Educational Telecommunications Council was established by the state legislature in 1989 to encourage and promote the use of technology for educational purposes and the development of technology systems to improve educational opportunity within the state. The ND ETC funds K-12 telecommunications and public broadcasting projects almost exclusively. Seven governor-appointed members who serve three year terms compose the ND ETC. Council members include the Higher Education Commissioner, Superintendent of Public Instruction, Central Data Processing Director, telephone industry representative, a school board member from a school with less than 500 students, a school administrator from a school with less than 500 students, and a school teacher. The ND ETC also has a Regional Advisory Committee made up of eight members, one from each region of the state, who provide input on grant awards.

■ ***Department of Public Instruction (DPI)***

The mission of the Department of Public Instruction is to provide a leadership system of educational opportunities for all people in North Dakota. There are four goals within the DPI: ❶ to coordinate a comprehensive, collaborative plan to enhance educational opportunities and services, ❷ to secure human and financial resources to support a system of educational opportunities, ❸ to provide technical assistance and consultation to educational service providers, and ❹ to foster quality education through implementation of statutes, regulations, policies, and procedures.

■ ***North Dakota University System (NDUS)***

The North Dakota University System (NDUS) includes 11 campuses. Although the president of each of the campuses reports to a single chancellor, each campus still maintains its autonomy. NDUS co-administers the state's Interactive Video Network (IVN). The Strategic Advisory Committee, composed of one representative from each campus, recommends programming, scheduling, and training needs related to the IVN. The committee reports to NDUS' Academic Affairs Council. Also reporting to the council is an executive committee, which advises and provides information on distance learning, as well as acts as a policy and decision maker for the IVN.

THE DRIVING FORCE

Grassroots efforts fuel North Dakota's educational technology and telecommunications initiatives. For schools and institutions of higher education alike, strong awareness of local needs coupled with the lack of a lead technology agency in the state have resulted in clusters of regional consortia and pockets of activity.

THE PLANS

■ ***Information Services Division (ISD)***

In 1997, House Bill No.1034 directed the Information Services Division (ISD) to develop guidelines for use by state agencies in preparing information technology plans. The guidelines will be used by state agencies to develop information technology plans, and will include five sections--the executive summary; project detail; a description of each of the agency's information technology systems; an inventory listing of the agency's hardware, software, and contracted services; and a comparison of the current information technology plan to previous plans. The Legislative Council's Information Technology Committee will examine ISD's guidelines prior to their being submitted to state agencies. This effort represents the state's first attempt to coordinate technology planning.

■ *K-12*

North Dakota does not have a statewide technology plan in place. Instead, regional consortia such as the state's 12 interactive video clusters assume the responsibility for their own technology and telecommunications planning and implementation.

Many schools in the state receive video-based instructional programming through the Prairie Public Broadcasting Network (PPB). PPB is a community licensed, independent, non-profit corporation that links seven broadcast stations in the state. PPB works with the North Central Council for School Television, a consortium of North Dakota and western Minnesota schools, and provides management and instructional television services for elementary, middle, and high schools. PPB also produces a two-level Spanish course for high school students in North Dakota. Interactivity for this course is accomplished via telephone and email. PPB actively makes use of the World Wide Web to provide outreach and curriculum services.

PPB is in the process of changing its approach to distance learning services, as it moves from its traditional role as a service and program provider to acting as a broadband delivery mechanism through its eight transmitter network. PPB anticipates converting to a digital network beginning in 1999, pending the outcome of a $1.5 million PTFP grant. The conversion of its eight transmitters to digital microwave and fiber optic networks will permit PPB to connect with the IVN network and other regional interactive video clusters throughout the state. Recently, legislative action moved the responsibility for overseeing the state's public broadcasting efforts from the Department of Public Instruction (DPI) to the North Dakota University System NDUS). This change has resulted in a more direct allocation of funding for PPB. Under the DPI, funding was first channeled through the North Dakota Educational Telecommunications Council and then distributed to the PPB in the form of grants. The move to NDUS may offer additional opportunities for distance learning to students at the 60 high schools in the state, which received satellite downlinks through PPB.

In addition to receiving PPB's programming, a number of schools in the state participate in satellite-delivered distance education through SERC and ASTS-Oklahoma State University. Schools in the state have Internet access through SENDIT, which is funded through the North Dakota Educational Telecommunications Council. Four schools are connected with the state's Interactive Video Network (IVN), which provides schools with inservice programming as well as instruction.

The Department of Public Instruction works with the Center for Innovation in Instruction (CII) to create professional development opportunities and provide technical assistance to teachers. CII is located at Valley City University.

■ *E-rate*

The Department of Public Instruction coordinates the E-rate effort in North Dakota. Schools and school districts are responsible for their own applications for funding.

■ *Higher Education*

In November 1997, the North Dakota University System (NDUS) presented to the state legislature its six-year *Strategic Plan 1998-2004.* Contained in its plan were recommendations for closer collaboration among NDUS' 11 campuses and supportive statements encouraging the development of technology for educational purposes. The document also outlined general strategies for making technology more readily available in the state for coordinating scheduling, course numbering, and administrative services among campuses. Details concerning the plan's implementation still need to be resolved. Efforts to increase cooperative opportunities for distance education in the state may be further aided by the work of NDUS' Vice Chancellor of Academic Affairs and IVN's Executive Committee, who are developing a broad-based distance learning plan for NDUS.

With the exception of NDUS' use of the IVN, infrastructure and program development for distance learning still take place at the institutional level. On each of NDUS' 11 campuses, one to three classrooms connect with the IVN. The University of North Dakota (UND) is the most vigorous user of the IVN, although it has investigated and used various technologies over the past several years, including satellite, compressed video, videotape, and online resources. The live interactive courses offered over the IVN lead to one of approximately 10 master's degrees in Educational Leadership, Business Administration, Public Administration, Social Work, General Studies, Elementary Education, Space Studies, Corporate Engineering, and Medical Technology.

Among UND's other distance education initiatives, its Center for Aerospace Sciences works with the Federal Aviation Administration to provide courses to other campuses via satellite. Course credit is awarded by the participating institutions. UND's medical college delivers continuing education to 16 rural community hospitals in its Medstar satellite project.

In addition to its use of the IVN for distance education, Minot State University (MSU) has developed MSUOnline, its virtual university. With financial support from a Title III federal grant, MSU is developing faculty training for its online courses, with the particular aim of providing courses for the state's most rural areas. MSU currently offers 14 online courses to approximately 100 students, and another 10 courses are under development. The university plans to develop an additional 10 courses for MSUOnline over a five-year period.

THE FUNDING SOURCES

■ *K-12*

In 1997, the state legislature approved a one-time appropriation of $5 million for school districts to support technology. The appropriation amounts to $46 per pupil, to be spent at the school districts' discretion. The funds will be dispersed by June 1999.

The North Dakota Educational Telecommunications Council (ND ETC) sponsors the Learning Technology Support Program. The program combines $2 million in funding from the federal Technology Literacy Challenge Fund grant awarded to the Department of Public Instruction, $925,000 appropriated by the 1997 state legislature to the ND ETC, and $72,000 that had been appropriated by the 1997 state legislature to fund SENDIT's dial-up service, which has since been discontinued. Approximately $3 million was awarded to 160 grantees in May 1998, and a second round of grants for up to $2 million may be made available in December 1998. The ND ETC's Learning Technology Support Program emphasizes connecting North Dakota schools to the Internet, training teachers to use technology, putting new computers in K-12 classrooms, and helping schools integrate technology resources into the curriculum.

Four teams of teachers in North Dakota received a US West Foundation 1998 Connecting Teachers with Technology grant. Each team was awarded an $8,000 grant to apply toward their technology project, personal laptop computers for each of the team members, and an opportunity to attend the U.S. West Teacher Network technology-training program in Denver.

■ *Higher Education*

Minot State University received a Title III federal grant in 1997 to support faculty development for online courses. MSU matched the $1.8 million federal grant with $1.3 million of its own. The funds will be directed at the first year of a five-year faculty training initiative for MSUOnline, MSU's virtual electronic campus.

■ *North Dakota University System*

The 1997-1999 legislative session placed all the funds for technology under the responsibility of the Board of Higher Education, which totaled $22.8 million. The first year of the biennium that ended on June 30, 1998 was allocated $11.2 million, and the second year of the biennium that will be ending June 30, 1999 has been allocated $11.6 million. The Interactive Video Network (IVN) had been allocated $980,000 for the first year of the biennium, and $1.1 million for the second year of the biennium.

TECHNOLOGY

■ *Interactive Video Network (IVN)*

The IVN is a digital compressed video network that connects all 11 campuses of the North Dakota University System, five tribal colleges, and several interactive video clusters. IVN's mission is to deliver high quality distance education by sharing intercampus resources and through the cooperation of schools, state agencies, the private sector, and other states. The IVN provides a digital two-way video conferencing system. Twenty-seven classrooms deliver conferencing and postsecondary programs to citizens.

■ *K-12*

SENDIT is a statewide telecommunications network for K-12 educators and students that provides Internet connectivity and services. The Department of Public Instruction and North Dakota State University's Information Technology Services cooperatively administer SENDIT. In July 1998, SENDIT ended its bulletin board system and began delivering resources via the World Wide Web. The change reduced the number of technical resources needed to support SENDIT's large number of users, increased the level of security on SENDIT, and provided a more user-friendly interface. SENDIT provides access to the Online Dakota Information Network (ODIN), the statewide library network.

■ *Medstar*

Medstar Health Education Network provides professional training to area health care professionals via satellite feed from the University of North Dakota to a hospital in the county.

■ *Prairie Public Broadcasting Network (PPB)*

PPB's network includes seven broadcast stations throughout the state, which are connected via satellite, fiber optics, and microwave. To complement its own uplink, PPB installed 60 satellite downlinks at K-12 schools in 1994.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

The discontinuation of the Department of Public Instruction's SENDIT bulletin board system illustrates the ebbs and flows seen in educational technology. SENDIT began operation eight years ago as a 60-school pilot project in southeastern North Dakota, and its success let to its growth into a statewide network for educators by 1993. At that time, there was no indication that the network of networks known as the World Wide Web would eclipse SENDIT's capabilities in two short years. But with the bulletin board system's demise comes other opportunities for educators: the DPI was able to redirect funds meant for SENDIT to bolster the North Dakota Educational Telecommunication Council's Learning Technology Support Program, which may ultimately prove more valuable to the state's teachers and students.

OHIO

ACRONYMS AND NETWORKS

- DAS—Department of Administrative Services
- DOE—Department of Education
- HETCO—Higher Education Telecommunications Council of Ohio
- OETNC—Ohio Educational Telecommunications Network Commission
- SOMACS—State of Ohio Multi-Agency Communication System

EXECUTIVE SUMMARY OF THE STATE

After many years of legislation, planning, and discussion, Ohio's statewide telecommunications networks are finally coming to fruition. Through the leadership of the Ohio Educational Telecommunications Network Commission, the Department of Administration, and other state agencies, the State of Ohio Multi-Agency Communication System (SOMACS) fiber-based network is about to make its debut. In another initiative, the state Board of Regents has been directing funds over the past several years to support a Higher Education Information (HEI) system, which eventually will enable more than 50 campuses to share data. Educational telecommunications activity in the K-12 sector has progressed rapidly through the Department of Education's SchoolNet initiatives. In addition to providing schools with the software, hardware, and infrastructure necessary for learning in the twenty-first century, SchoolNet funding also attempts to redress educational inequities.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Over the past four years, public K-12 education in the state has benefited from three related telecommunications initiatives: Ohio SchoolNet, SchoolNet Plus, and the Ohio SchoolNet Telecommunity. With the full support of Governor Voinovich, the state General Assembly passed House Bill 790 in June 1994, which established Ohio SchoolNet, the state's voice, video, and data educational telecommunications network. Ohio SchoolNet strives to support and improve local school efforts through telecommunications technology. The installation of the network has been supported through the sale of $95 million in bonds. To receive funding, school districts must develop or have in place a district technology plan.

In 1995, SchoolNet Plus evolved from Ohio SchoolNet. Whereas the SchoolNet initiative focuses on infrastructure development for all K-12 schools, SchoolNet Plus targets schools and students in grades K-4 and aims to provide at least one interactive computer workstation for every five Ohio public school students in grades K-4. Computers began to be introduced in Ohio classrooms during the 1996-97 school year as part of SchoolNet Plus.

The Ohio SchoolNet Telecommunity is a partnership that involves the participation of Ameritech (among other telephone companies), which has provided $18 million in overcharge funds to educational telecommunications efforts through a settlement agreement with the state's Public Utilities Commission. The Ohio SchoolNet Telecommunity will link schools to businesses, institutions of higher education, and community resources via two-way interactive connections.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Department of Administrative Services (DAS)***

The Department of Administrative Services works with the Department of Education to develop standards for educational technology and infrastructure for Ohio SchoolNet. DAS also cooperates with the DOE in administering the Ohio Education Computer Network (OECN), which provides online computerized services to school districts.

- ***Department of Education***

The DOE oversees the Ohio SchoolNet, SchoolNet Plus, and the Ohio SchoolNet Telecommunity initiatives. In addition, the DOE disseminates information about schools through its statewide Education Management Information System (EMIS), and cooperates with the Department of Administrative Services in the operation of the Ohio Education Computer Network (OECN).

- ***Ohio Educational Telecommunications Network Commission (OETNC)***

In 1995 the General Assembly renamed the Ohio Educational Broadcasting Network Commission the Ohio Educational Telecommunications Network Commission to more accurately reflect its expanding role in the development of the state's infrastructure. Along with the Department of Administrative Services and Office of Budget and Management, OETNC was instrumental in developing and planning the State of Ohio Multi-Agency Communication System (SOMACS). SOMACS is a fiber optic-based interconnection system to be used by several Ohio agencies; however, the greatest capacity of the system is reserved for Ohio's public telecommunications organizations. This leased fiber backbone replaces the microwave systems formerly used by public television stations and state agencies.

OETNC also oversees the activities of its eight Educational Technology Agencies located throughout the state. The agencies are affiliated with the public television licensees; they provide stations with instructional television programming, and work to integrate technology into the learning process.

- ***Higher Education***

Although there is no statewide educational telecommunications system or policy for higher education in Ohio, there are opportunities for professionals to discuss distance education through the Ohio Educational Telecommunications Network Commission. Approximately 30 two- and four-year colleges and universities are members of the Higher Education Telecommunications Council (HETCO). HETCO is the primary vehicle for exchanging distance education information and ideas among higher education institutions. The Ohio Programming Consortium (OPC), which grew out of HETCO member organizations, permits group discounts for telecourses and videoconferences.

THE DRIVING FORCE

K-12

Redressing equity has been at the center of funding allocation decisions in educational telecommunications. Each of the DOE's major telecommunications projects—SchoolNet, SchoolNet Plus, and SchoolNet Telecommunity—has provisions that favor awarding grants to low income school districts. For example, the wealthiest one-third of Ohio's school districts receives SchoolNet Plus funding only after poorer school districts obtain necessary funding. It is interesting to note that the Ameritech monies that support the SchoolNet Telecommunity initiative also resulted from inequity in charging customers.

Higher Education

With no centralized guidance from the state Board of Regents, each institution of higher education in Ohio forms its own policies and pursues its own plans for distance learning.

THE PLANS

K-12

Ohio's schools are in the midst of gaining access to telecommunications infrastructure and equipment. Ohio's SchoolNet is Ohio's is a partnership among Ohio's government, local businesses, schools and communities to provide Ohio's public school students and teachers with today's technologies and the means to use them. It is comprised of four principal programs: School Net, SchoolNet Plus, the Ohio SchoolNet Telecommunity and Raising the Bar. Ohio is providing access technology to a population of 1.8 million students and 95,000 teachers in 660 Ohio public and joint vocational school districts.

In the SchoolNet initiatives, Ohio's schools have flexibility in choosing the platforms, hardware, and software appropriate for their needs. Schools that may already have the wiring necessary for SchoolNet (and would therefore not need an allocation to cover wiring/installation expenses) will receive technology credits that may be applied to additional equipment or access to a WAN.

The SchoolNet site office has several projects in the works: a field guide, School Net in a Bag (similar to Internet in a Box), and regionally produced and distributed CD-ROMs. Over the next two years, approximately $10 million in SchoolNet funds will go towards educator training. Professional development groups are currently meeting to discuss strategies to help teachers effectively use SchoolNet's multimedia tools. In addition, educators in the state will benefit from conferences and teleconferences that center on "best practices" information.

House Bill 770 established the Interactive Video Distance Learning pilot to provide eligible schools grants so that students and educators can access resources through interactive technology to improve learning. It had a budget of $9.2 million that seeks to build different but compatible models of interactive video distance learning. The pilot is an ATM network for voice, video, and date transmission to enhance teaching and student learning.

■ *Ohio Board of Regents*

A portion of the Board of Regents' recent energies has been directed at developing and implementing its Higher Education Information (HEI) system, which replaces the Ohio Board of Regents' Uniform Information System and will become operational in 1998. By sharing data electronically among the state's higher education institutions, the Board of Regents hopes to assist policy makers, college and university representatives, and lawmakers in the decision-making process.

The HEI Advisory Committee is composed of institutional representatives selected by the Inter-University Council and the Ohio Association of Community Colleges. The Committee members have broad policy level experience, and are in close communication with colleges and university presidents.

■ *Ohio University*

Ohio University delivers courses through the Ohio Learning Network, which encompasses a two-way audio and video microwave television network and a full T-1 compress video network linking Ohio University's main campus with its five regional campuses. In addition, Ohio University offers courses via the World Wide Web.

In the spring of 1998, 33 undergraduate and graduate courses were offered via distance learning with 990 students participating in the program. The College of Medicine, College of Engineering and the College of Education at Ohio University also provide distance learning courses.

■ *Cleveland State University*

Cleveland State University is offering undergraduate and graduate courses via distance learning through the Internet, two-way interactive videos and audio SMART rooms, PBS broadcasting programs offered by the university. Approximately three to four thousand students participate every year in the distance program and about 40 courses will be offered in the fall.

Cleveland State University and Akron University have been cooperating to deliver courses in social work for a master's degree in social work via SMART rooms. In addition, Cleveland State University works with Cayahoga Community College sharing courses via SMART rooms.

■ ***Cuyahoga Community College (Tri-C)***

Cuyahoga Community College is delivering distance learning courses through Cable College courses, Telecourses, Independent Courses and web-based courses. Cable College offers courses utilizing the power of television, which is taught live and interactive over cable television. Telecourses offer 30 half-hour television programs, with three broadcasts per week for up to ten weeks. Independent Learning Courses are credit courses designed as self-paced alternatives to traditional classroom instruction. Textbooks and workshops are supplemented with video and/or audio taped instruction or computer communications.

■ ***Sinclair Community College (SCC)***

The Distance Learning Program at Sinclair Community College, which began in 1980, encompasses both synchronous and asynchronous modes of delivery. Courses are available to students by video, audio, print, CD ROM, Internet, television, cable, ITFS and videoconferencing. In the fall of 1998 there will be a total of 187 courses offered in these various formats.

Distance Learning courses continue to be a very popular option for students who find that this alternative enables them to achieve their career goals, upgrade skills and receive degrees more quickly and conveniently. During the 1997-98 academic year, there were 10,088 enrollments in the various distance learning courses.

Students at Sinclair can now get a complete degree by means of distance learning. Two degree programs are available in this manner: ❶ the A.A. degree in Liberal Arts and Sciences, and ❷ the A.S. in Business Administration.

■ ***Ohio Educational Telecommunications Network Commission (OETNC)***

OETNC continues to progress in its migration from a microwave to the SOMACS fiber-based network. SOMACS received initial funding from the General Assembly in Fiscal Year 1995. Implementation of SOMACS began in 1996, and the system is expected to become fully operational during 1998.

THE FUNDING SOURCES

■ ***K-12***

Of the $95 million allocated to the SchoolNet project, $50 million targets the wiring of all 100,000 public school classes in the state. The additional $45 million funds the purchase of computers and peripheral equipment for classrooms in school districts that represent the lowest adjusted property valuation per pupil.

In 1997 the Ohio Department of Education used Technology Literacy Challenge Funds (TLCF) to extend SchoolNet Plus into grades 5 through 8 classrooms in its "Raising the Bar in the Middle Grades" program. A total of 31 schools throughout the state received funding to purchase computers and peripherals, support professional development, and fund related needs.

A total of $26 million in state grants is available to all state-chartered public and non-public K-12 schools in the SchoolNet Telecommunity project. Five types of grants exist: planning and administrative grants for schools/consortia, content grants (equipment and programming) for schools/consortia, network usage grants for schools/consortia, grants for Ohio SchoolNet Telecommunity faculty, and other telecommunications grants. A Policy and Oversight Committee makes funding recommendations to the Ohio Superintendent of Public Instruction. Priority for funding is given to low-wealth schools and Ohio SchoolNet prototype schools.

■ ***Higher Education***

Over the past several years, the state General Assembly has included appropriations to support the Board of Regents' Higher Education Information (HEI) system. In fiscal year 1996, the Board of Regents distributed $1.05 million among 38 main campuses and 24 branch campuses, and in fiscal year 1997, the total was $670,000. For fiscal year 1998, the Board of Regents requested $3.8 million and received $2 million from the General Assembly. In fiscal year 1999, the Regents will again receive $2 million to fund its statewide network. These numbers translate into a total of approximately $56,000 received by each main campus and $7,700 received by each branch campus.

■ ***SOMACS***

The Department of Administrative Services Telecommunications Computer Division oversees funding for SOMACS. SOMACS receives funding through the state by bond indebtedness and general revenues. The infrastructure is able to generate enough funds to operate the system without incurring any cost or loss; it is a self-sustaining system.

TECHNOLOGY

■ ***Ohio Education Computer Network (OECN)***

OECN consists of 24 Data Acquisition Sites, which serve approximately 90 percent of the state's public school districts. The sites provide computerized fiscal services and student support services to their member districts. Each OECN Data Acquisition Site is connected to the state microwave network, which is administered by the Department of Administrative Services. This connectivity permits electronic data transfers between Data Acquisition site data centers and the Department of Education, as well as electronic mail capabilities between all participating school districts and the DOE.

■ ***Higher Education Information (HEI) system*** *(formerly the Uniform Information System–UIS)*

The Ohio Board of Regents' Higher Education Information (HEI) system is a relational database that is slated to become operational in 1998.

■ ***Ohio Academic Resources Network (OARnet)***

OARnet facilitates and encourages the dissemination of information throughout the state and connects to national and international networks. All Ohio colleges and universities are part of the system, and membership is open to for-profit and other non-profit organizations. OARnet is part of the state's supercomputer center at Ohio State University and is transported on SOMACS, which is a SONET ring fiber network. OARnet switched from using SONIC microwave system two years ago, because it was not adequate to conduct all the necessary functions.

■ ***Ohio Educational Telecommunications Network Commission (OETNC)***

SOMACS will interconnect the OET Network Operations Center with Ohio's eight public television licensees, the 15 public radio licensees, nine radio reading services, eight educational technology agencies, and the Ohio State House. In the past, OET was interconnected to the state's public television stations using a microwave system with eight circuits. With the T-1 based SOMACS, the 77 circuits interconnect OET and each of its affiliates with high-quality, high-speed reliability. In addition, SOMACS provides high-speed Internet access to each affiliates and provides easy access to all state agencies via the centrex phone system.

OTHER MISCELLANEOUS BUT RELEVANT INFORMATION

Ohio has more freenets than any other state in the nation, in both cities and in rural areas. Cleveland, Akron, Toledo, Columbus, Cincinnati, Lorain, Dayton, and Athens all expanded their freenets in recent years. Freenet is primarily offered through the public libraries within the state and cities. In addition, some of the cities and municipalities are providing freenets to the community.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Ever since television was the reigning technology, Ohio has consistently been a leader in using telecommunications for educational purposes. The Ohio Educational Telecommunications Network Commission's proactive involvement in creating a fiber optic network in partnership with other state agencies illustrates three points concerning statewide telecommunications planning. First, OETNC's leadership reveals that the locus of successful telecommunications planning can exist outside of departments of education, higher education bodies, and departments of administration. Second, it demonstrates how effective, multi-agency collaborations can be developed. Third, OETNC's ability to advance its technology and services along with the times serves as a notice to other educational broadcasters that they do not have to assume the role of a technological dinosaur. As the statewide SOMACS network becomes fully implemented in the near future, it will be interesting to see what other roles OETNC will take in Ohio's new telecommunications environment.

OKLAHOMA

ACRONYMS AND NETWORKS

- OETA—Oklahoma Educational Telecommunications Authority
- OneNet—The Oklahoma State Network for Education and Government
- OSRHE—Oklahoma State Regents for Higher Education
- SDE—State Department of Education

EXECUTIVE SUMMARY OF THE STATE

Oklahoma's K-12 educational technology efforts focus on implementing the vision articulated in the State Department of Education's (SDE) *1996 Instructional Technology Plan*. The SDE has worked to extend training opportunities for teachers throughout the state, with the reasoning that merely supplying more computers to classrooms will not benefit students or teachers in the long run. The State Regents for Higher Education have expanded the state's telecommunications network, OneNet, which now connects more than 1,000 sites representing hundreds of thousands of users. To help establish which advanced technology directions higher education institutions in Oklahoma should pursue, the Regents are following up on the recommendations that were advanced in Technology 2000, a comprehensive study of technology use throughout higher education and by the Citizens' Commission on the Future of Oklahoma Higher Education, a group of 36 Oklahomans appointed by the Regents to develop a long-range plan for Oklahoma Higher Education. The Citizens' Commission offered forty-four recommendations focused on accessibility, quality, and incentives.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Oklahoma has been a repository of collaborative, locally planned distance education initiatives for the past decade, with the establishment of one of the nation's first K-12 projects in the panhandle area of the state. Oklahoma State Regents for Higher Education established one of the first state distance education video networks in 1970 and have continued to provide system-level leadership in both policy and practice. Oklahoma State University's powerful production facilities and course development capability have furthered the state's reputation in satellite-distributed distance education. Through its Arts and Science Teleconference Service (ASTS), OSU has worked successfully with schools to produce and deliver advanced courses and professional development to students and teachers nationwide. Other state institutions such as the University of Oklahoma and Rogers State College (now Rogers State University) have been active in using telecommunications for distance learning.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***K-12***

Within the State Department of Education (SDE), the Instructional Technology/Telecommunications Office is responsible for coordinating the state's educational technology efforts.

■ ***Higher Education***

In addition to setting policy and standards for institutions of higher learning in Oklahoma, the Oklahoma State Regents for Higher Education administer the state's network, OneNet. The data, voice, and video network is connected to over 1,000 sites, including state colleges and universities, the state's vocational technical schools, K-12 schools, state agencies, hospitals, and libraries. The Regents have operated a state telecommunications network since 1971. With the expansion into OneNet, additional operational support and oversight is provided by the office of state finance.

■ ***Oklahoma Educational Television Authority***

The Oklahoma Educational Television Authority (OETA) is Oklahoma's statewide public television network. In addition to regular PBS programming, the network provides 25 hours per week of K-12 instructional programming. OETA also broadcasts several hours of higher education telecourses each week. With over 7,500 telecourse enrollments each year, Oklahoma's telecourse enrollment figures are among the highest per capita in the US.

THE DRIVING FORCE

Recognizing the critical importance of connectivity and the network to education and government, the state Data Processing and Telecommunications Advisory Committee authorized the expenditure of $14 million in 1995 to implement the OneNet plan. Both houses of the legislature and the governor's office were involved in the planning and decision-making. Interest in promoting the growth and development of the network remains high in both the executive and legislative branches of government.

The State Regents have made technology and distance learning a high priority within the higher education system. All twenty recommendations from the Technology 2000 report have been accepted and approved for implementation, and a number of them are already being implemented. Additionally, thirteen of the forty-four recommendations from the Citizen's Commission on the future of Oklahoma Higher Education concerned technology issues. The State Regents have also approved each of those recommendations and their implementation is in progress.

The recent steps in K-12 educational technology planning and implementation can be attributed to the vision described in the state's technology plan, an undertaking which in turn can be credited in part to the State Department of Education Superintendent, Sandy Garrett. In the mid-1980's, the superintendent was involved with connecting school districts in the Oklahoma Panhandle in a fiber optic network, and since that time she has worked to bring greater access to technology for the state's schools.

THE PLANS

■ Legislative Activity

Some legislation in technology and education has been recently proposed. On April 9, 1998, the governor signed House Bill 2651, which provided the definition of educational technology. In addition, the governor signed House Bill 1815 entitled "Oklahoma Telecommunications Act of 1997" on June 13, 1997.

■ K-12

In December 1996, the State Department of Education (SDE) released its *Instructional Technology Plan*, which outlines the direction the state intends to pursue over the next several years and proposes funding mechanisms which would allow K-12 public schools in Oklahoma to implement technology at the district, school, and classroom levels. The plan describes four goals which focus on teachers and classrooms, and not directly on students.

The first goal highlights the SDE's continued emphasis on teacher training. It states that all teachers in the state of Oklahoma will receive adequate and appropriate training and the support necessary to help students learn through the use of computers and telecommunications technologies. The second goal—that effective software and online learning resources will be made available to all public school teachers as an integral part of the public school curriculum of the state of Oklahoma—draws attention to the broad dissemination of materials. The plan's third goal is that all classrooms within the state of Oklahoma will have access to computers for both student and teacher instructional use. The fourth and final goal states that all classrooms within Oklahoma will have access to the Internet and/or other forms of telecommunications methodologies.

The SDE has taken steps to implement its vision for teacher training. Throughout 1997 and 1998, the SDE worked to secure funding for training, equipment, and access to technology. SDE also provided Internet training in cooperation with the South Central Regional Technology in Education Consortium (SCRTEC) at the University of Oklahoma. The SDE also devoted Technology Literacy Challenge Funds to its Teacher Telementor Program, a five-year train-the-trainer initiative that targets building a statewide cadre of 300 trainers by the program's conclusion.

In an effort that more centrally involves students and technology, the Oklahoma State Department of Education developed the Instructional Technology Priority Academic Student Skills (PASS), a list of skills for instructional technology that all students in Oklahoma are expected to acquire before leaving the public school system. The broadly worded priorities define the minimum criteria for students' instructional technology abilities, with each level of technology skill building upon previous levels.

More than 65 school districts in the state rely on compressed video or full motion video to share instruction and materials. Over 150 school districts have dedicated data connections to Onenet. As the state network expands over the next several years, the number of participating school districts is expected to increase.

- ***Oklahoma Educational Telecommunications Authority***

OETA intends to replace its microwave network, pending the outcome of an NTIA/PTFP application for $900,000. The new system would involve building or replacing 41 microwave towers and installing four transmitters and 15 translators. The equipment currently in use dates back to the 1960's and has become difficult to maintain, primarily because the original manufacturers either have gone out of business or no longer have staff who are knowledgeable about the old equipment. OETA has upgraded its uplink facilities and has the resources to lease a transponder.

- ***Higher Education***
- ***State Regents for Higher Education***

In October 1996, the State Regents charged the Citizens' Commission on the Future of Oklahoma higher education with identifying direction-setting initiatives to guide Oklahoma higher education into and through the opening decades of the 21st Century. The commission's report included 44 recommendations dealing with a wide range of challenges and opportunities. The Oklahoma State Regents recently approved implementation of all the commission's recommendations for advanced technology.

The following are summaries of some of the Citizens' Commission's recommendations that have high priorities concerning technology: State Regents should assure that distance education services are readily accessible and of high quality; State Regents should plan for the impact of interactive television and technology to advances on the culture of Oklahoma higher education; institutions of higher education should be specific in articulating the goals with respect to what technology is intended accomplish and should be held accountable; and institutions and organizations should be provided incentives and benefits to participate in distance learning.

The State Regents have taken action on a number of the recommendations from both the Citizen's Commission and Technology 2000. The regents have allocated over $250,000 for initiating electronic transcripts statewide and have provided additional funding for state licenses for library databases, a Web-based "Oklahoma MarketPlace" for graduates and employers, and faculty instructional development programs. Major policy revisions have also been made to the electronic media policy.

Oklahoma became the first state outside the Western Governors Association to join the Western Governors University when Governor Keating made a joint announcement with the State Regents on June 27, 1997. Oklahoma has also been active in the creation and development of the Southern Regional Electronic Campus, another collaborative distance education effort through the Southern Regional Education Board. Additionally, the State Regents have created the Oklahoma Electronic Campus, a Web site for state system distance learning courses and programs. The site was initiated in the spring of 1997.

■ ***Oklahoma State University (OSU)***

The distance learning program at OSU is part of the Western Governors University system. Courses and degrees are offered via satellite, compressed digital television, and Internet. Approximately six credit and four non-credit satellite courses, fifty compressed digital television courses, and twenty web-based courses will be offered in the fall. The OSU distance learning program offers eight to ten master's and bachelor's completion degrees.

In addition, about fifty students will participate in the credit course via satellite, and thousands of students are expected to enroll in the short non-credit courses via satellite. The web-based courses are two years into the development stage, and are in the process of performing beta testing with on-campus students. Approximately 60 students are expected to enroll in the Web-based courses. Approximately 300 to 500 students will participate in the compressed digital television based courses, which are a part of a Master of Science in Telecommunications Management program. The courses will expand to eight states.

The distance learning program at OSU continues to deliver satellite telecourses and nationwide high school instruction in German, Algebra, and AP Calculus. These high school courses are primarily targeted to students who reside in rural areas where there is no easy access to advanced and specialized courses.

■ ***University of Oklahoma***

The Center for Distance Education at the College of Continuing Education at University of Oklahoma offers several options to students. The Center manages the electronic delivery of courses via interactive television. The interactive video transmits courses throughout the state using fiber optics to deliver two-way interaction. The program, formerly called Talkback TV, is included in all interactive video services, including compressed video running in interactive mode offered by the University of Oklahoma through OneNet.

In addition, courses in business, psychology, history, economics, and geography are delivered via satellite. Telecourses, which combine broadcast lectures and independent study, permit students to view the lectures on public or cable television, or at the CCE labs.

■ *OneNet*

OneNet currently transports nearly 1,000 videoconferences, primarily distance learning programs, across the state each week. In the near future, OneNet will migrate its video network to the newly-adopted Internet protocol (IP) video standard. This will significantly improve bandwidth utilization and network management, as well as lower costs for OneNet users. OneNet is also in the process of upgrading its systems to support video streaming and access to important databases. OneNet is committed to supporting not only real-time, but also "asynchronous" learning.

THE FUNDING SOURCES

■ *K-12*

The State Department of Education's recent attempts to gain state funding for technology development have been unsuccessful. For the 1997-98 academic year, the state superintendent asked for a total of $62 million from the state legislature; this translated into approximately $100 per student to be allocated for technology, a request that was refused. For the 1998-99 school year, the superintendent requested $60 per student. Part of the difficulty in asking for extra funds solely for educational technology stems from the fact that public K-12 education accounts for 38 percent, or $1.6 billion, of the total state budget already (51 percent of Oklahoma's annual budget supports all levels of education). Against this background, additional requests for technology for use in public schools appear excessive.

K-12 schools' technology initiatives have received support from other sources, however. The State Department of Education (SDE) has used Title 1 School Support Network funds to support the Title 1 Network, a video-conferencing network introduced in March 1998. Through a settlement reached with Southwestern Bell, the State Department of Education received $3 million. The Technology Literacy Challenge Fund grants yielded the state $2.3 million, which supported the SDE's Teacher Telementor Program.

■ *E-rate*

Public schools in Oklahoma must file on their own for Universal Service Funds. Across the nation, Oklahoma ranks second in the number of applications filed.

■ *Higher Education*

State appropriates to the State Regents for FY 1999 have allowed for technology and distance learning initiatives to proceed both at the state and institutional levels. At the system level, OneNet funding was increased by an additional $1 million, $2.6 million was designated to support "receive sites" for distance learning, and additional funds will be used to promote faculty instructional development and library databases. At the institutional level, budgeted amounts for data processing for academic support reflect a nine percent increase. This area would include educational media services and much of the technology purchases.

Oklahoma State University and the University of Oklahoma are both slated to receive $500,000 to support the opening of a technology transfer office on their campuses. The technology transfer partnership, involving the higher education institutions and the state, resulted from the governor's 1998 appointment of a Deputy Secretary of Commerce. The alignment is meant to create greater opportunities for economic growth for the state through technology research.

- ***OneNet***

The OneNet operating budget for FY 1999 is $7.9 million. The continued expansion of OneNet is attributed to a rapid growth in the customer base and the assumption of administrative functions, including revenues and costs, previously carried out by a third party.

TECHNOLOGY

- ***OneNet***

OneNet is the official telecommunications and information network for the state of Oklahoma. OneNet includes 50 regional network hubsites connected by fiber optics, with the network backbone connecting Norman, Oklahoma City, Stillwater, Tulsa, and Muskogee. The state owns over 500 miles of the installed fiber to the major metropolitan locations, while it leases DS-3 fiber to rural areas. Public schools, vocational-technical schools, colleges and universities, courts, libraries, and government agencies all connect to the statewide network. Once OneNet's expansion is completed, each county will have at least several user sites.

- ***Title 1 Network***

The Title 1 videoconferencing network connects eight sites throughout the state. The network will provide professional development and technical assistance in the Title I areas of reading and mathematics. In addition, teachers working in schools with a high concentration of students living in poverty will benefit from the network.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Oklahoma faces a dilemma common to many states. For the past decade, state agencies, schools, universities, colleges, and other institutions have invested considerably in distribution technologies such as satellite and ITFS. With the growth in asynchronous instruction offered by the World Wide Web and the Internet, institutions and agencies must make some difficult decisions about which technologies should be pursued further. A decision to invest in increasing Internet access for teachers means less money for other educational technologies, such as video-based distance education courses. For institutions which have built their reputations on the quality of their satellite-distributed instructional programming, such as Oklahoma State University, the challenge is to develop collateral expertise in creating and marketing newer forms of instruction while facing fresh competition. Launching into a new field can be a difficult undertaking when so much time and so many human and material resources have been devoted to establishing an institution's technological identity.

OREGON

ACRONYMS AND NETWORKS

- Ed-Net—Oregon Ed-Net
- OCCDEC—Oregon Community College Distance Education Consortium
- OUS—Oregon University System
- VOS—Video and On-line Services Unit of the Information Resource Management Division

EXECUTIVE SUMMARY OF THE STATE

Oregon's efforts in infrastructure development and educational technology and telecommunications planning continue to develop in breadth. Recently, all levels of education--K-12, community colleges, and the university system—have issued technology plans and strategic plans, which include goals of increased collaboration. The OPEN project and Database Initiative reflect K-12 educators' interest in developing computer-based systems to support administration and information sharing. The state's institutions of higher education have all focused on offering an increased number of courses via the World Wide Web. Existing courses have become more dependent on web-based resources, and courses entirely reliant on the World Wide Web have been developed. Through the efforts of the Oregon University System, many of the state's four-year institutions of higher education have coordinated their distance education efforts for a number of years, activity that could not be seen among Oregon's two-year institutions. Now that the community college system has collaboratively worked to produce a Strategic Plan of the Oregon Community Colleges for Distance Learning, more activity can be expected at that level.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Oregon gained an early reputation as a leader in statewide educational telecommunications through the activities of Oregon Ed-Net, which was established by the state legislature in 1989. Ed-Net has since merged with the Department of Administrative Services and is now VOS. Unlike the situation in other states, the existence of a strong, state level organization did not suppress educational telecommunications efforts at the local level. Oregon's Education Service Districts, independent consortia, and individual institutions all contribute to grass-roots technology activity that complements state level initiatives. Other state level leadership in educational technology and telecommunications from the Department of Education and University System has been less forthcoming.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Department of Administrative Services (DAS)***

The Information Resources Management (IRM) is a division of the Department of Administrative Services, where its mission is to develop quality planning, information systems, products and telecommunications services. In 1995 Oregon Ed-Net, the state's public statewide telecommunications network for video and Internet communications, was incorporated into the IRMD and renamed Video and On-Line Services (VOS). VOS's video and Internet services extend to more than 250 organizations, primarily within the education, healthcare, and government communities. In 1997, the Oregon State Government Technology Overview was submitted to the IRM Division. The Overview is an executive summary of Oregon's statewide technology environment.

■ ***Oregon Telecommunications Forum Council (OTFC)***

In 1995, Senate Bill 994 created the OTFC, which included 1,300 shareholders from throughout the state. The members of the OTFC include user representatives, provider representatives and local government representatives. There are five members from the user group that consists of representatives from RODEO NET, Jewell School, University of Oregon, Southern Oregon Magazine and Columbia Foundation. There are four representatives from Transport Logic, FirstPoint Communications, Central Lincoln People's Utility District and US West Communications, acting as members of OTFC. There is one member representing the local government.

The goal of OTFC is to improve the quality of life and economic development in Oregon communities by enhancing the delivery of education, health care and government services, and supporting the development of business. The goal will be achieved through affordable telecommunications solutions, training, and support to effectively utilize telecommunications.

■ ***Higher Education***

■ ***Oregon University System (OUS)***

Known as the Oregon State System of Higher Education (OSSHE) until January 1998, the Oregon University System was created nearly 70 years ago when the state legislature created the Board of Higher Education to manage Oregon's four-year colleges and universities. Today, OUS institutions include Eastern Oregon University, Oregon Institute of Technology, Oregon State University, Portland State University, Southern Oregon University, Western Oregon University, the University of Oregon, and an affiliated institution, Oregon Health Sciences University. The Oregon University System currently serves 68,057 students in regular programs, 25,496 students in summer session and non-traditional programs, and another 100,000 students enrolled in non-credit programs.

■ ***Oregon Community College Distance Education Consortium (OCCDEC)***

The Oregon Community College Distance Education Consortium includes 17 colleges in the state of Oregon and two in southwestern Washington. OCCDEC's members promote and provide distance education for non-traditional students, with the goal of providing access to education to all students regardless of their location.

Distance learning leadership within the consortium rests with the Distance Learning Council, which provides a structural point of focus for statewide distance learning and related issues for the Oregon community colleges. The function of the 10-member Council is to provide analysis and synthesis of statewide distance learning issues by combining distance learning operational perspectives with broader instructional and institutional perspectives. The Council addresses statewide distance learning issues and develops recommendations for submission to the Council of Presidents Distance Learning Subcommittee.

■ ***Oregon Wireless Instructional Network (WIN)***

WIN is a consortium of K-12 schools, community colleges, and state colleges and universities that coordinates the delivery of an array of instructional services. The idea of WIN originated in discussions among a group of educators within Oregon's Willamette Valley, the state's major population center, who gravitated towards establishing a regional ITFS infrastructure that would serve a wide range of program providers and users. Today, the Oregon WIN consortium includes Lane and Linn-Benton Community Colleges, the Linn-Benton-Lincoln ESD, the Oregon University System, Oregon State University, Portland State University, University of Oregon, and Western Oregon University. An eight-member Board of Directors oversees WIN's activities.

THE DRIVING FORCE

Because Oregon has had a statewide infrastructure for educational telecommunications in place for several years for use by K-12 and higher education institutions, the current and projected activity within the state reflects a need to expand existing programs and services, as well as a need to retain a competitive edge. At the K-12 level, the state is developing computer-based administrative support to complement the state's video-based instruction. In higher education, meanwhile, both community colleges and four-year institutions have been rapidly issuing World Wide Web-based courses. All of this activity occurs with the knowledge that a number of neighboring states that were formerly behind in their planning for educational telecommunications have narrowed that gap. To remain competitive, especially within higher education, Oregon must continue to enhance the quality and variety of its instruction.

THE PLANS

■ ***K-12***

In January 1997, the Oregon Department of Education (ODE) produced its Educational Technology Plan. The Plan, which is undergoing revision, articulates four departmental goals that correspond to the four national technology goals for education improvement: all Oregon students and teachers will have access to appropriate technology; every school and classroom will be connected to the Internet; effective software and online learning will be an integral tool to support the school curriculum; and all Oregon K-12 teachers, administrators, and staff will have the immediate and specific education and support they need to help students learn through technology. The department hopes to meet the *Technology Plan* goals by the year 2001.

In another initiative, ODE is in the process of fine-tuning a model for a relational database in its Database Initiative project. House Bill 3636 compelled the ODE to develop a budget and accounting system for school districts and education service districts that allows for valid comparisons of expenditures among schools and among districts. Data gathered from the system is to be placed in a relational database that is accessible to the public. The ODE initiated a pilot project during 1998, and selected 16 school districts to participate reflecting diversity in size, ethnic mix, special needs populations, program costs, and geography. The database is expected to be tested and introduced by January of 1999.

■ ***Oregon Public Education Network (OPEN)***

The Oregon Associated Education Service Districts sponsors OPEN, a grassroots initiative to enable all K-12 schools to participate in a coordinated information network. OPEN helps school districts assess their technology needs, recommends equipment, and provides price guidelines and technical advice. OPEN's plans include continuing to implement its network backbone infrastructure, establishing regional, district, and school networks to provide a connection to every classroom, establishing curriculum development and professional development programs, and developing collaborative programs for continuing education.

■ ***E-rate***

The Oregon Public Utilities Commission passed temporary rules that allow schools to obtain federal telecommunications discounts. Meanwhile, the State Superintendent of Public Instruction is working to get Oregon's discounts aggregated at the state level, since the state legislature has equalization built into the basic school support. In this manner, all school districts would receive the same telecommunications discount. The Department of Education has produced teleconferences over VOS to assist schools in filling out the necessary forms.

■ ***Oregon Telecommunications Forum Council (OUTFACE)***

The OUTFACE has implemented the Oregon Telecommunications Plan based on participation by the citizens, providers, regulators; and public, private and nonprofit sectors. Some of the recommendations presented by the Plan are to provide an affordable basic level of services, to offer services that are accessible, and to form partnerships among public, private and nonprofit telecommunications users and/or providers.

■ ***Higher Education***

■ ***Oregon University System (US)***

Ousts 1996 document *Distance Education Policy Framework* articulated a distance education strategy to expand the state's higher education system's learning opportunities both on-and off-campus by using multiple technologies. The Framework described five policy areas that need to be addressed in order for distance education opportunities to flourish: planning, quality and program/courses; student services; faculty issues; tuition/fees and student enrollments; and technical standards. Although the Framework did not set concrete policy, it did identify high priority action items, including needs assessments, establishing of guidelines that permit sharing of courses and programs among institutions, and establishing system-wide plans for infrastructure development.

■ ***Oregon Community Colleges Distance Education Consortium (ACIDIC)***

Oregon's community colleges articulated a vision for collaborative distance learning in the May 1997 document, the *Strategic Plan of the Oregon Community Colleges for Distance Learning (SPOCCDL)*. The plan resulted from a statewide coalition formed in August 1996 by Oregon's seventeen community college presidents and the Commissioner of the Office of Community College Services. The strategic plan set out to establish a common vision, define strategic directions, and identify implementation strategies for the coordinated delivery of distance learning services throughout the network of Oregon community colleges. An 18-member advisory committee was formed, composed of faculty, instructional and student services chief administrative officers, librarians, and distance learning specialists.

The advisory committee's strategic plan contained a number of conclusions and recommendations. Among their observations, the committee noted that a unified planning body would reduce the complexity of the committee structure overseeing distance learning in the Oregon community colleges and might provide some economy of scale. Such a body would also provide continuity for monitoring and assessment of state, national, and international distance learning developments and applications. The committee therefore recommended that the *SPOCCDL* and OCCDEC committees be merged into a single body charged with oversight and management responsibilities for distance learning in the Oregon community colleges.

Since the recommendation, the *SPOCCDL* and OCCDEC committees have merged to streamline the operation of delivering distance learning to the Oregon community colleges. The committees have implemented agreements whereby the colleges would share programs and services of distance learning.

The institutions participating in the Community College Distance Education Consortium have witnessed considerable changes in the number of distance learning students enrolled and courses offered. Most of the growth has taken place in online courses. During the 1997-98 academic year, for example, the number of online courses offered increased by 133 percent, while the number of enrolled students grew by 93 percent.

■ ***Oregon State University (OSU)***
Among its distance learning options, OSU offers nine courses entirely over the World Wide Web, including courses in education, computer science, English, mathematics, philosophy, speech communication, and fashion theory. In addition, more than 35 other courses at OSU are partially supported by the World Wide Web.

■ ***Network for Education and Research in Oregon (NERO)***
NERO is a partnership involving the Oregon Joint Graduate Schools of Engineering, which include the Oregon Center for Advanced Technology Education, Oregon Graduate Institute, Oregon Health Sciences University, Portland State University, and the University of Oregon. NERO strives to facilitate collaborative research and teaching among the engineering and computer science faculty in the member institutions and with their counterparts at industrial sites. Among its activities, NERO is developing and testing ATM technology, distance learning, and multi-media workstations among its sites. NERO eventually hopes to provide high-speed, high-bandwidth connections within and between the OJGSE sites, which would enable the delivery of new desktop services to participants.

■ ***Oregon Wireless Instructional Network (WIN)***
In 1996, Oregon WIN entered into a partnership with American Telecasting, Inc. (ATEL) of Colorado Springs to build the ITFS system. Oregon WIN also designed an online scheduling system to provide access to the ITFS spectrum for program providers, and will create a central information site for users to view program offerings. The consortium is planning to support and market joint programs that build on the expertise of individual campuses.

■ ***Video and On-line Services (VOS, formerly Ed-Net)***
In 1989, the state legislature created Oregon Ed-Net as a public statewide telecommunications network for video and Internet communications. VOS also offers video network management, scheduling, and interconnection services to state agencies and education providers.

Currently, VOS delivers distance education content for the K-12 system through a one-way video two-way audio network. OUS uses VOS's two-way interactive video to provide 12,000 programming hours a year of course content. A number of Oregon universities and community colleges use VOS's Internet dial-up network for Internet instruction and course text conferencing.

VOS looks to expand its network of interactive video sites and assist OUS in meeting the demand for more distance education through video.

THE FUNDING SOURCES

■ K-12

In 1997, Oregon received $1.9 million in Year One Technology Literacy Challenge Funds (TLCF), which the state divided into planning and implementation grants. A total of 47 applicants from 64 school districts received subgrants for $2,000 to $5,000 to develop a strategic, long-range (three- to five-year) technology plan. In addition, 10 school districts were awarded subgrants ranging from $52,000 to $200,000 to support the implementation of portions of their technology plans. In order to qualify for TLCF grants, school districts must have filed a qualifying technology plan with the state Department of Education.

In February 1997, Oregon received its first year allocation from TLCF of $1.8 million dollars. In December 1997, Oregon received its second year allocation of $3.8 million dollars and a third round of funds is anticipated in the fall of 1998.

For the ODE's Database Initiative project, Senate Bill 5523 appropriated $800,000 of the $2.9 million project budget directly to the Department of Education to facilitate rapid start up of the project. The remaining balance of the project budget of $2.1 million was appropriated to the Emergency Board in House Bill 5054. The Emergency Board released $1.4 million of the balance to the project and directed the Department of Education to make a progress report at each Emergency Board meeting and to request the remaining balance of $700,000 in project funding at the April Emergency Board meeting. The April Emergency Board released the remaining $700,000 to the Department of Education.

■ Video and On-line Services (VOS)

VOS receives ongoing funding from a state agency surcharge for telecommunications use, from customers who purchase network services, and from organizations that pay annual member fees.

TECHNOLOGY

■ Oregon Public Education Network (OPEN)

OPEN's hub, the OPEN Technical Center, is located at Clackamas Educational Service District. The OPEN TC aggregates data originating at the participating technology centers, and connects to OPEN's Internet Service Provider (North West Net) and the Department of Administration's Oregon Net 2000.

■ Video and On-line Services (VOS)

VOS operates two satellite networks, referred to as Network I and Network II. K-12 schools comprise most users of Network I. Network I delivers one-way video, two-way audio instruction at broadcast video quality via Ku-band satellite to downlinks at over 240 subscribing schools, colleges, universities, education service districts, libraries, medical centers, state agencies, and local government centers throughout the state. Network II uses VSAT digital compression technology to provide up to 15 channels to 37 videoconferencing sites. VOS added a gateway service to Network II that enables VOS to link a satellite network with terrestrial networks. COMPASS is Oregon's only public statewide computer network. COMPASS provides local dial-up access to local, national, and international online information resources in over 95 percent of Oregon communities.

- ***Oregon Wireless Instructional Network (WIN)***

WIN's ITFS signal coverage of the 100-mile Willamette Valley is gained by locating towers in Eugene, at the southern end of the valley, in Salem, the state's capital in the center of the valley, and in Portland, the state's largest population center, located at the northern end of the valley. The three ITFS transmission towers are linked with two-way microwave, which allows program providers to serve all three ITFS networks from a single location. Consortium members have received licenses for 36 ITFS channels in Salem and Eugene, Oregon, and are seeking participation from ITFS channel holders and program providers in other areas of the state. By connecting the systems throughout the Willamette Valley, program providers will be able to reach over 65 percent of Oregon's population as well as accessing statewide, national and international telecommunication providers in Portland.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Oregon's early and centralized commitment, relative to other states, to supporting a statewide system of educational telecommunications has enabled it to provide leadership in distance education at all levels of instruction. What is interesting to note in Oregon's case is the fact that, unlike the situation in Iowa, a single technology has not overshadowed distance learning initiatives. VOS's satellite systems exist side-by-side with the WIN ITFS system and NERO's fiber network. The variety of technological options for distance learning has not overly fragmented planning efforts, however, unlike the situation seen in states such as Missouri. As it faces challenges to its educational telecommunications services over the next several years, Oregon will be able to rely on at least two key assets: the robust-yet-contained heterogeneity of the technology it has in place, and the collaboration that occurs at both the grass roots and state level.

PENNSYLVANIA

ACRONYMS AND NETWORKS

- OIT—Office for Information Technology, under the Governor's Office of Administration
- PDE—Pennsylvania Department of Education
- PEN—Pennsylvania Education Network
- SSHE—State System of Higher Education

EXECUTIVE SUMMARY OF THE STATE

Since the beginning of his term in 1995, Governor Tom Ridge has served as an impetus for information technology efforts within Pennsylvania. The $127 million, three-year Link to Learn initiative, which is in its third year, has encouraged the growth of local, community based networks and is providing the financial means to enable their interconnectivity. This K-12 initiative has generated much excitement and interest, and although the project's direction originates at the state level, much of its program implementation remains at the local and regional levels.

The State System of Higher Education is implementing the Keystone Library Network (KLN), a shared virtual library system that will first integrate the 14 SSHE university library automation systems, and will be open to other interested partners in 1999. The KLN, with services fully accessible via World Wide Web, will encourage and support the growth of distance learning programs among the State System universities.

Pennsylvania State University is opening its new World Campus, a virtual university delivering well known, graduate level programs asynchronously across the nation. Built on the foundation of a solid distance learning program that provides both undergraduate and graduate services, the World Campus may become a model for other virtual universities.

The Governor's Office of Administration recently reorganized the commonwealth's Office for Information Technology to more effectively administrate technology efforts, a reflection of the commonwealth's commitment to using telecommunications and technology. Since the commonwealth does not heavily involve itself in centralized planning for educational telecommunications, telecommunications and technology grow on an as needed basis to serve educational goals.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Educational telecommunications planning in Pennsylvania exists in scattered local and regional groups. Independent distance education efforts occupy the Pennsylvania Department of Education, Penn State University, and the State System of Higher Education. Actions in 1993 and 1994 toward establishing stronger, more coordinated planning for telecommunications and distance education lacked support to sustain projects. Efforts at centralization resulted in PANET—a statewide, state owned, private phone system made available to schools—which served as a starting point for a fiber optic metropolitan area network in the capital region. Another move toward centralization originated in the Pennsylvania Distance Education Consortium, formed in 1994 as a non-profit consortium for brokering distance education courses among higher education institutions, especially community colleges. The PENN*LINK system, meanwhile, connected schools and libraries to the Internet and distance learning information. Since 1995, telecommunications and technology efforts have concentrated on expanding existing regional infrastructure and programs, bridging technology gaps, and integrating technology into a decentralized statewide system.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Office for Information Technology (OIT)***

The Office for Information Technology, under the Governor's Office of Administration, assumes responsibility for developing and promulgating statewide policies and standards governing the management and use of the Commonwealth's information technology investments. The OIT, reorganized into four units in January 1998, oversees several technology initiatives, including the construction of a state applications IntraNET, the construction of a state government, high speed, fiber optic MAN in the capitol area, and BuildPEN, which encourages a partnership among communities, volunteers, and corporate sponsors to build the Pennsylvania Education Network (PEN). The governor identified strategic planning within the state as an immediate priority. The strategic planning initiative begun in 1996, *Breaking Through Barriers: A New Direction*, takes a comprehensive look at ways to make the state government more efficient and customer driven through technology. The initiative revamps the administration of funding, procurement, personnel, policy, standards, planning, and performance achievement.

■ ***Pennsylvania State University***

Penn State concentrates its efforts on developing its World Campus, a virtual university. The Distance Education Advisory Committee (DEAC), formed in 1994 to oversee distance learning efforts within Penn State, serves as the World Campus' Steering Committee. DEAC has produced policy guidelines, presented a program vision, and worked with AT&T's foundation grants for "Innovation in Distance Education Projects." Under the DEAC-guided distance learning programs, most initiatives focused on undergraduate courses, which by 1997 included over 200 courses. The World Campus Steering Committee will continue the planning and policy guidance as the World Campus opens its doors and prepares to offer a greater variety of graduate offerings.

■ ***State System of Higher Education (SSHE)***

The SSHE is a public university system comprised of 14 member institutions that enrolls over 94,000 students. Recently, SSHE created the Center for Distance Education to coordinate the distance learning efforts among the institutions. Until now, each institution undertook its own distance learning efforts. The Keystone Library Network Initiative is another SSHE collaborative effort to provide a shared integrated library system, create a virtual union library catalog, and aggregate demand for purchased services, such as a full-text online journal database.

■ ***Pennsylvania Department of Education (PDE)***

The reorganization of the Pennsylvania Department of Education resulted in a new Office of Educational Technology. One of the Office's first actions will be to hire an E-Rate Specialist to provide further direction for the schools in applying for E-Rate funding. The Link to Learn initiative and the Office of Educational Technology support statewide educational technology planning. The PDE's planning outlines general goals and directions for educational technology; the actual implementation is left to be decided at the local level, a prime example of "centralized decentralization". This integration is proving to be effective in creating a comprehensive approach toward the development and use of educational technology.

THE DRIVING FORCE

Without doubt, Governor Ridge and the Office of Information Technology have been the driving forces in developing technology for education within the commonwealth. The governor's efforts to promote the development of local and existing resources have provided the momentum to make the best possible use of the commonwealth's technology resources. The capitol area MAN, for example, initiated in 1993 during the first part of the Ridge Administration, saw only 10 percent of the agencies connected. Now, all executive state agencies are connected to this network.

At Penn State, the president assigned a study team to investigate the possibilities for a virtual campus in the summer of 1996. By the spring of 1997, the team recommended that the university found the World Campus, a university-wide, nationally and internationally delivered online virtual campus. Introduction of this program began in January 1998.

Within the State System, the chancellor created an Office of Information Technology in the fall of 1995 to bring leadership and cohesion to the System's information technology initiatives. Since this change, the State System has moved to implement the Keystone Library Network, establish a Center for Distance Education, and thoroughly reengineer its wide area network - SSHEnet – to substantially increase bandwidth under an asynchronous transfer mode (ATM) network topology.

THE PLANS

■ ***Pennsylvania State University's World Campus***

The World Campus builds on the current distance education program at Penn State. The university's well-established student services will be key to the successful implementation of the World Campus. Existing relationships within departments and among faculty members will also give the World Campus an advantage during the project's initial stages. The Campus will focus on master's level and post-baccalaureate certificate programs, for which Penn State has an established reputation. Undergraduate courses offered through earlier Penn State programs would also be continued. The introduction of programs began in January 1998, with three or four to be started by April 1998. The project has been sponsored in part by a $1.3 million grant from the Sloan Foundation.

All World Campus courses will be asynchronous, but cohort based, with fixed start and stop dates. Programs scheduled to begin soon are in turf grass management (which began in January 1998) and an undergraduate certificate program in business logistics. A master's program in chemical dependency counseling is awaiting approval. The development of programs in agriculture economics, GIS, biostatistics, and dietetic management is being considered. Penn State has revised issues pertaining to graduate student residency requirements and standards for professional degree programs in light of its World Campus activities. Penn State identified the learning outcomes of a residency, and created an innovative and flexible approach to satisfy the university's requirements.

■ *Link to Learn*

The Link to Learn initiative focuses on the development of educational technology and distance learning programs in the state. It serves as the commonwealth's guiding technology policy, an approach that encourages local and regional development of programs and initiatives within a set of broader goals and policies, as well as support for providing infrastructure. The Link To Learn initiative sets out to achieve four goals: connectivity, content, computers, and professional development. Technology is not an end in itself, however. The ultimate goal, rather, is the improvement of education through the use of technology.

The project is in the second of its three-year implementation schedule. The first year concentrated on developing LANs in each of the school districts, while the second year focused on making high speed Internet connections available to every school district. The third year targets sustainability issues. In order to receive funds, each proposal from a school or school district must outline a plan for professional development for the use of the technology, thereby ensuring the necessary training. Each district and school decides how best to implement technology and infrastructure for its own needs.

The higher education component of the first year of the Links to Learning initiative called for networks to be sponsored by a community or a higher education institution. The second year required that the networks be funded through a higher education institution, which left institutions scrambling to create consortia and strengthened K-12 and higher education community bonds.

■ ***BuildPEN***

BuildPEN is another program stemming from the governor's office to encourage the growth and expansion of the network of community networks that will form PEN, the Pennsylvania Education Network. PEN will connect schools, libraries, vocational-technical schools, colleges, universities, and communities. The PEN program, launched in March 1997, encourages a grassroots effort by communities, volunteers, and corporate sponsors to work together to purchase and install LAN components within the schools.

■ ***E-rate***

The Pennsylvania Department of Education is hiring an E-rate specialist to work with schools to obtain funds. PDE disseminates information and provides guidance to the school districts in applying for these funds.

THE FUNDING SOURCES

■ ***World Campus***

The Alfred P. Sloan Foundation has awarded a $1.3 million grant to Penn State to help the University launch its World Campus. To date, World Campus appears to be very active in the distance learning education movement.

■ ***SSHE***

SSHE is comprised of fourteen public universities. Approximately one-half of its funding is derived from direct state appropriations, and the other half comes largely from student tuition and fees. In 1995, the chancellor and the 14 university presidents established a $3.8 million dollar internal fund to support the System's major information technology initiatives—the Keystone Library Network, the Center for Distance Education, and the reengineering of SSHEnet; the latter initiative was also supported through a $300,000 grant from Bell Atlantic

■ ***Link to Learn***

Link to Learn is a three year, $127 million initiative. Much of the funding goes directly to the 501 public school districts. A total of $33.3 million was made available to school districts to purchase modern computers and software, and establish local area networks that would also be shared with local communities in the first year; $34.3 million was distributed in its second year to connect schools and other institutions via wide area networks. Much of the project's focus in its first two years centered on creating its infrastructure. To counter this, funding in 1997-98 concentrates on sustaining the project and providing professional development.

Seven million dollars is dedicated to the higher education component of the Link to Learn initiative. A request for $7 million each for libraries and private schools has also been made for 1998, as a way to spur growth of technology in those sectors.

The Infrastructure Investment Project, a part of the Link to Learn initiative, will distribute up to $6 million in competitive grant projects fostering sustainable technology investments that address educational goals. This is an extension of the Technology Testbeds Project, a competitive grants program funded at $4 million in 1996-97 to test and deploy new telecommunications technologies, services, and applications.

TECHNOLOGY

■ *Pennsylvania State University's Existing Infrastructure and Program*

Although undergraduate distance courses at the 24 campuses of Penn State currently number over 200, no degrees are offered. Penn State offers one master's level course in acoustics, delivered via satellite. Satellite is used for professional development courses and national teleconferences as well. Courses are also delivered over dial-up compressed video (Picture Tel) for campus-to-campus or campus-to-off-campus connections.

■ *State System of Higher Education*

Of the 14 participating SSHE institutions, seven have developed distance learning programs, which offer a total of approximately twenty courses per semester via video conferencing or the World Wide Web. West Chester offers a master's degree program in Communications Disorders, and advanced placement web courses in Mass Communications; Clarion offers a nursing program through video conferencing; Edinboro offers a survey course in astronomy.

The reengineering of SSHENet has been fully implemented and the network connects all fourteen universities, four branch campuses, and the Office of the Chancellor via a multiple T-1 backbone supporting ATM transmission. The network, in existence for the past seven years, implemented ATM last year. Each institution has video classrooms in place that are accessible either over the SSHENet or via ISDN. As part of the Link to Learn initiative that is building the fabric of the Pennsylvania Education Network, SSHEnet is playing host to a growing number of schools and intermediate units.

The Link to Learn project's second-year mandate that higher education institutions create a consortium as a basis for some of the regional networks has involved a number of SSHE institutions. The CheynetNet Consortium, including five K-12 schools, one vocational-technical school, one university, and one community network, was completed and operational in March 1998. Bloomsburg has also established a consortium in its SUSQnet. Another six institutions, including Mansfield, Millersville, and Clearfield (part of Lock Haven), are involved in consortia, as well. Many of these consortia involve interconnections with SSHEnet.

■ *Pennsylvania Education Network (PEN)*

The Pennsylvania Education Network (PEN) will emerge as a network of networks resulting from the Link to Learn and the BuildPEN initiatives. Although the tangible outcome of these efforts will be an infrastructure, the underlying commitment will bring technology, interconnectivity and professional development that will enable the effective use of technology in education. Keystone Central School District in Clinton County boasts one of the best entirely integrated uses of educational technology in terms of its infrastructure, program, curriculum development, administration, and classroom management. Other commendable programs can be found at the Green County Consortium in southwest Pennsylvania and at the Bethlehem School District, which has succeeded in placing computers in every classroom.

■ ***Pennsylvania Cable Network (PCN)***

PCN, a nonprofit cable television service available in two million homes in the commonwealth, televises educational and public affairs programming. Educational offerings include literacy training programs for adults, and 20 hours per week of college-level instruction from state institutions of higher learning. Pennsylvania residents interested in receiving college credit for courses shown on PCN make arrangements with the college or university sponsoring the program, and these credits can then be applied on-campus toward a formal degree. Recently, Montgomery County Community College, one of the schools participating in distance learning on PCN, announced plans for making an associate's degree available through the network.

In February 1998, PCN began airing "Homework Help," a weekly call-in program designed to help elementary and secondary students with their homework assignments. This live, interactive program is the first aimed specifically at the K-12 level, and complements the literacy skill training, preparatory GED programs, and college-level telecourses already carried on the statewide service.

PCN's public affairs programming features live and same-day coverage of the Pennsylvania General Assembly, along with significant events in the commonwealth. The network's subscriber growth in recent years is attributed to the evolution of its public affairs coverage, and the change from analog microwave delivery to digital satellite distribution. Participating cable companies pay a monthly per-subscriber fee to cover network capital and operating costs. PCN receives no federal or state funds.

■ ***Pennsylvania Public Television Network (PPTN)***

The Pennsylvania Public Television Network (PPTN) links nine public television stations through its statewide microwave system to provide K-12 program development and daytime delivery of instructional television. PPTN also offers online and other distance learning services. PPTN is currently working on converting its microwave transmissions from analog to digital, which will allow a split into five simultaneous channels, one of which will be devoted to education. Funding will be sought during fiscal year 1998-99 to support these conversion activities.

FUTURE DIRECTION

The growth of the local networks through the Link to Learn initiative in the first two years of the program demonstrates the success of a grass-roots effort to establish educational technology plans. Questions are bound to arise concerning equity, however, because of the initiative's many recurring infrastructure and hardware related costs.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Penn State has set the tone for distance learning in the United States through the consistently high quality of the work conducted by its distance learning faculty members. Penn State's World Campus is poised to continue expanding the university's influence. Most notable is the emphasis the university places on its commitment to student services, which responds to the long list of students who have been frustrated and disenchanted with distance education in the past. Penn State's marketing of its virtual university as a student service-centered institution will force its competitors to consider their own abilities to meet the unique array of supports needed by distant students. By prioritizing the World Campus' capacity to meet distant students' needs, Penn State wisely has taken steps to reduce the likelihood of student attrition (a formidable foe of all distance education programs). In the process, Penn State may also have redirected virtual university planning efforts from discussions of course content and tuition costs, to deeper considerations of the spectrum of services an institution of higher education must commit to.

The governor's Link to Learn project, and the concomitant financial outlay associated with it, puts Pennsylvania among the lead states for its commitment to educational technology. Although funding of technology preceded any needs assessment, Link to Learn administrators were confident that the basic level of equipment and networking prescribed were essential to the development and sharing of any content among users.

RHODE ISLAND

ACRONYMS AND NETWORKS

- Board of Governors for Higher Education
- CCRI—Community College of Rhode Island
- URI—University of Rhode Island

SUMMARY OF THE STATE

Technology in education has been improving as a result of planning by the Rhode Island Department of Education and funding spent on higher education. In 1996, Governor Almond initiated the state plan called Rhode Island's Comprehensive Education Strategy to improve the state's public schools. One of the first outcomes of this plan is an online information system called Information Works. Also in 1996, the Rhode Island Department of Education revealed the Rhode Island Educational Technology Plan, its first comprehensive analysis of the statewide educational technology infrastructure. The schools in Rhode Island are able to access the Rhode Island Network for Educational Technology (RINET), which provides statewide high speed telecommunications infrastructure for K-12 education, public libraries, Internet E-mail accounts, and technical support services. Funding for technology has been important in developing and improving the state's infrastructure for education. Rhode Island has received $2 million for the second round of the grant, and the Board of Governors of Higher Education proposed a $40.6 million Higher Education Technology Initiatives.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

In 1994, the Rhode Island Board of Governors for Higher Education examined the role of telecommunications across the state's public postsecondary system. The Board established a 14-member External Committee on Telecommunications and Higher Education to address the issues related to the role of higher education in the state's telecommunications infrastructure and to formulate a set of recommendations for consideration by the Board. After a series of 10 meetings the committee submitted its report, which identified a series of findings, a group of goals, and a set of recommendations for the Board of Governors for Higher Education. Among their findings, the committee stated that the Rhode Island public system of higher education was woefully ill-equipped and under-funded to meet the telecommunications and computer networking needs of its students, faculty and staff, and the public, and that much of the telecommunications equipment in the public system of higher education was out-of-date and inadequate for supporting emerging forms of information technology. The committee also noted that although all three public institutions of higher education were studying how to improve their telecommunications and computer networks capabilities, little or no thought was given to establishing compatible infrastructures and applications for the entire public system of higher education. Based on these and other findings, the committee developed a series of long-range goals, which highlighted institutional interconnection and financial support.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Rhode Island Board of Governors for Higher Education***

The Rhode Island Board of Governors for Higher Education is charged with the duties of overseeing the operation of the three public higher education institutions in the state: the University of Rhode Island, Rhode Island College, and Community College of Rhode Island. The Office of Higher Education is the Board's administrative and research arm. In fulfilling the state and federal statutory and regulatory responsibilities of the Board of Governors, the Office of Higher Education serves to avoid costly duplication of services by carrying out and coordinating certain functions on a system-wide basis. With regard to distance learning, the Board adopts policies that assist and encourage collaborative efforts for the institutions, which in the past have pursued their own programs.

■ ***Department of Secondary and Elementary Education***

The Commissioner of Elementary and Secondary Education heads the Department of Elementary and Secondary Education. The department has six programmatic areas: finance, education aid, instructional support, school improvement support, special services support, policy support, and information services. The Information Services program, which coordinates technology initiatives, is a result of merging the Department of Library Services into the Department of Elementary and Secondary Education in fiscal year 1996.

THE DRIVING FORCE

The impetus for Rhode Island's current wave of coordinated technology planning comes from the realization that its technology efforts, especially within K-12 settings, lag behind those of its neighboring states. Overall, the state's telecommunications infrastructure has been ignored for a number of years, and Rhode Island's immediate priorities focus on maintaining government services, not education. With high speed Internet connections to schools and a relatively well developed system of distance education within higher education institutions established, educators are already ahead of the rest of the state in their access to telecommunications technologies.

THE PLANS

■ ***K-12***

In 1996, Governor Almond initiated the development of a state plan to improve the state's public schools. That plan, Rhode Island's Comprehensive Education Strategy, calls for setting high academic standards for all students, and for regular state testing to measure how well students are meeting these high standards. The strategy also calls for the public reporting of those test results to be done in a way that helps parents, schools, and the public see where students are making progress, and where they need additional help to meet achievement goals. The strategy was adopted by the Board of Regents and built into law through Article 31 of the 1998 budget. One of the first outcomes of Article 31 was the creation of an online information system, called Information Works, to serve the public's demand for accountability and the schools' need to inform their decision-makers. Information Works debuted in the spring of 1998 and is the product of a partnership between the Rhode Island Department of Education and the University of Rhode Island's National Center on Public Education (NCPE).

In 1996, the Rhode Island Department of Education unveiled the Rhode Island Educational Technology Plan, its first comprehensive analysis of the statewide educational technology infrastructure. The plan resulted from a six-month research and planning study carried out by the Rhode Island Technology Task Force. The plan outlined an information technology framework for education, provided implementation strategies, and suggested additional steps for growth of information technologies in Rhode Island.

Schools in the state have access to the Rhode Island Network for Educational Technology (RINET), a statewide partnership of the Department of Elementary and Secondary Education, Brown University, the University of Rhode Island, WSBE, and school districts. RINET provides a statewide high speed telecommunications infrastructure for K-12 education and public libraries, Internet use, e-mail accounts for educators, and technical support services, including E-rate reimbursements. All but two of the state's 36 school districts currently obtain Internet services through RINET's dial up or direct connections.

In 1996, Project SMART (Systemic Model for Advancing Restructuring with Telecommunications) brought together the efforts and resources of Rhode Island K-12 educators with university faculty to provide an intensive professional development program for effective technology use within the classroom setting. Teams of teachers from across the state received two weeks of hands-on training on the integration of technology and the Internet into their curricula. In 1997, Project SMART evolved into the Rhode Island Teachers and Technology Initiative (RITTI). Funded by a three-year grant from the Rhode Island Foundation, RITTI aims to provide more than one-quarter of the Rhode Island public school teachers with training and laptop computers by the year 2000. Through a 12-day, project-oriented training program that is conducted using laptop computers, teachers are introduced to applications covering communicating with parents, effective management and administration, and connecting with other professionals both in and out of education. During its pilot year, 340 teachers in Rhode Island, one from every public school building, received training. An additional 900 teachers participated during the summer of 1998. In addition to the Department of Elementary and Secondary Education and the Rhode Island Foundation, the project involves the cooperation of the University of Rhode Island, Toshiba, and Microsoft.

E-rate

Because RINET had pre-existing contracts with all the state's schools and a contract with Bell Atlantic through the year 2000, it was eligible to submit a statewide application for E-rate funds. RINET is working hard to make sure every school takes advantage of E-rate funds. An automated system will take care of invoicing to schools based on the discount amounts received, and RINET will administer the reimbursement paperwork.

Higher Education

Board of Governors for Higher Education

As part of a system-wide planning process, the Board of Governors recently requested that each public higher education institution submit an Academic Plan, which will be updated annually. The Board's Academic Planning and Program Committee has worked directly with the chief academic officers to form the plans. The use of technology to support research and instruction is one of the plan's aspects. The public institutions began submitting the plans to the Board of Governors during the summer of 1998.

University of Rhode Island (URI)

Within the University of Rhode Island, the Information Resources Council (IRC) functions as a university-wide advisory body with respect to information resources policy, standards, services, physical facilities, and allocation of resources. The IRC's Instructional Initiatives Subcommittee strives to enhance teaching and learning through the use of information technology including: specially equipped labs and classrooms, computer-enhanced presentations, demonstrations, simulations, tutorials, video, distance learning, and access to libraries and knowledge bases. The subcommittee's initial charge is to develop a process for identifying top instructional priorities for 1998 bond funding.

The University of Rhode Island offers one degree program, a Ph.D. in Pharmacology, to students in Maine, via compressed video. URI is exploring current applications of technology, distance learning, and the virtual university. URI identified universal access (ensuring that all students have a personal computer) as a top priority goal and has named a target date of the year 2000. URI is also involved in a number of collaborative technology activities with Brown University. URI and Brown University submitted an application to the National Science Foundation for funds to support a connection through the vBNS network. A high bandwidth pipe from Providence to the Boston GigaPOP would be installed as part of this effort.

Community College of Rhode Island (CCRI)

Among the state's public postsecondary institutions, CCRI houses the most expertise in distance education. CCRI's current distance learning program delivers 32 telecourses per year over the state's public broadcasting station. CCRI also offers three courses each semester via videocassette and one Internet course in composition. CCRI's faculty is focusing efforts on developing both Internet-based and Internet-enhanced courses. Videoconferencing sites that are being established on CCRI's three campuses will begin to deliver courses in the spring of 1999. These sites will interconnect with sites in CCRI's five, off-campus centers.

THE FUNDING SOURCES

■ *K-12*

Rhode Island received $1 million in its first year of Technology Literacy Challenge Fund (TLCF) grants, and $2 million in TLCF's second funding round. The funds support school access through the RINet project; they will expand dial-in Internet access for schools without resources for direct digital connections, and provide access to schools from homes, libraries, or community sites. TLCF grants also went to the Project Teachers in Technology, a professional development program targeting Internet use sponsored by a coalition of schools and higher education institutions. Competitive School Technology Coordinated Improvement grants required schools to balance expenditures for computers, networking, connectivity, and teacher training to improve technology competency, and to create usable classroom content as described in the state technology plan.

A three-year grant from the Rhode Island Foundation supports the Rhode Island Teachers and Technology Initiative (RITTI), which is now in its second year. RITTI provide teachers throughout the state with technology training and laptop computers.

■ *Higher Education*

In 1995, the Board of Governors of Higher Education proposed a $40.6 million Higher Education Technology Initiative for upgrading and improving the telecommunications infrastructure among the three institutions. The proposal was endorsed by the legislature and approved in a 1996 referendum. The bond issue will end in 2002, after allocating $20.9 million to the University of Rhode Island, $7.6 million to Rhode Island College, and $4 million to the Community College of Rhode Island.

The Higher Education Technology Initiative spent $8 million in its first year (from November 1996 to December 1997), most of which supported technology and network infrastructure. The second year also focused on infrastructure improvements, but also made available $700,000 in funding for a Student Information System at URI, videoconferencing, and other distance learning investments. Future plans include establishing RHENET, a frame relay data network connecting the three institutions and the Office of Higher Education.

TECHNOLOGY

■ *K-12*

Approximately 200 of the state's 400 schools have direct connections via 56K, one-quarter T-1, or T-1 lines to RINET's frame relay network. Three hundred of the schools are expected to be connected by December 1998. Internet service is provided through Massachusetts-based

BBN via two T-1 connections. A partnership with Bell Atlantic allows RINET to manage $1.5 million in pooled money to support school telecommunications charges. Schools pay for routers and nominal fees for network connection and services. Dedicated 56K frame relay service charges are $1000 per year, 384K service is $2500 annually, and a T-1 connection costs $4500 per year.

■ *Higher Education*

Through a project initiated by the Board of Governors for Higher Education, the state's public institutions of higher education share a videoconferencing network. The University of Rhode Island has three videoconferencing sites on its main campus, one at the graduate school, where two more are planned, and a mobile unit at its College of Continuing Education. Three sites will be installed at the Community College of Rhode Island, and one at Rhode Island College by the fall of 1998. The system is dial-up point to point using PictureTel equipment that normally transmits at 384 Kbps. The Board of Governors has signed a contract with MCI to be the system's ISP.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

For a number of years, Rhode Island's small size inhibited planning for educational telecommunications and technology. With no real barriers in the state related to geographic isolation, dedicating resources to distance education for K-12 schools and postsecondary institutions seemed superfluous. Relative to its previous efforts, the state's technology planning over the past two years is overwhelming. Unlike almost every other state, Rhode Island continues to demonstrate little interest in distance education applications in its technology plans, especially within K-12 schools. Instead, educational technology and telecommunications plans emphasize Internet and World Wide Web connections, which indicate that access to information remains a larger issue for educators and students in Rhode Island than access to formal education programs.

SOUTH CAROLINA

ACRONYMS AND NETWORKS

- CHE—Commission on Higher Education
- IRC—Information Resources Council
- OIR—Office of Information Resources
- SCETV—South Carolina Educational Television
- SCINET—South Carolina Information Network (the umbrella term covering all state networks)
- SREC—Southern Regional Education Board
- TAC—Technology Advisory Council

EXECUTIVE SUMMARY OF THE STATE

Although a statewide master plan directing technology standards and new initiatives within the state does not yet exist, the 1997 formation of the Information Resource Council (IRC) is likely to play a large role in coordinating distance learning efforts. The IRC, with its overarching mission to provide and plan for efficient use of technology in South Carolina, has several standing committees, which bring together affected parties in technological arenas. These committees have developed a number of strategies that support the coordinating of IT planning with business planning, data sharing, improved access, economic commerce, security, confidentiality, and privacy issues.

Infrastructure efforts and systems currently act independently, as demonstrated by the recent development of the Technical Education System's Interactive Video Network. The Office of Information Resources (OIR) uses existing systems to serve current needs, even as progress is made toward upgrading technologies. The state's public broadcasting system's massive satellite delivery infrastructure is now served by a 32 channel digital transponder and has been interfaced with older ITFS systems. The ITFS and microwave networks have been turned around so that sites can originate programs for redistribution over satellite. OIR supports the migration toward an ATM network to serve the data, voice, and video needs of all agencies, education, and public television entities in the state.

Higher education has relied on SCETV for many years, yet institutionally based programming has not been actively pursued in the past. Some planning and coordination efforts, which began several years ago, have been put on hold as institutions continue to struggle to prepare for a crossover to performance-based funding, which becomes effective in 1999-2000. The funding criteria, which include issues related to collaboration and distance learning, should encourage the further development of distance learning in the state.

Technology efforts in K-12 education have been rejuvenated with the K-12 Technology Initiative, a comprehensive four-year program begun in 1996 to bring technology infrastructure, hardware, and training into the schools. The initiative has committed over $60 million in the first three years and has already established dedicated line connections via the statewide WAN to the Internet for all schools. Although the program goals and planning are centralized, implementation related decisions are left to the school districts.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

SCETV, the state's public broadcasting system, has led educational technology and distance learning initiatives for over 30 years. One of the first educational television agencies in the country, SCETV continues to offer national programs, develops institutional programs and software for Satellite Educational Resources Consortium (SERC), and provides continued services for local educational needs.

Initiative 3 was established as one of the action items under the Commission of Higher Education statewide strategic planning process and contained representatives of institutions, and service providers. This initiative established a task force which completed a draft report that focused primarily on summarizing the kinds of technology available at the time.

With the exception of the Technical Education System's Interactive Video Network, no higher educational institution has developed its own infrastructure. The institutions of higher education generally have made use of the available infrastructure through SCETV and the state.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Office of Information Resources (OIR)***

The Office of Research and Statistics, under the Budget and Control Board, has the responsibility for state government information resources planning. A sister office, the Office of Information Resources, is responsible for all technology services provided to South Carolina state government agencies. This includes acquisition, administration, management and operation of the statewide long distance voice, data, and state-owned SCETV backbone microwave networks. The OIR has a Strategic Plan in place and is in the process of implementing action plans. A plan for the migration of state operated systems to ATM technology is currently underway.

- ***Information Resources Council (IRC)***

The Information Resources Council (IRC) is a high-level advisory and coordinating council charged to ensure that information and telecommunications technology achieves the governor's vision and goals for South Carolina. In March 1996 Governor David Beasley issued an executive order that created the IRC, which held its first meeting in April 1997. The IRC coordinates all technology applications across the government sector. Of its six standing committees, one deals specifically with Technology and Education.

■ *Commission on Higher Education (CHE)*

The Commission on Higher Education is the coordinating board for all 34 public higher education institutions in South Carolina, which includes the University of South Carolina system of eight institutions, as well as the Medical University of South Carolina, eight other institutions, and 16 technical colleges. Each public institution has its own board of directors. The CHE's duties include program approvals, funding approvals, approval of budget and facilities requests, collection of statewide information, and administration of a wide variety of programs. There is limited direct involvement with private higher education institutions in the state.

Although CHE has some authority for strategic planning, which also includes distance learning activities, it has not established any regulatory policies with respect to distance education. The result is that higher education institutions in the state work within a permissive environment. Although formalized service areas for state institutions do not exist, some designations of regional and statewide missions have taken place. As more institutions begin to work aggressively on distance learning programs, coordination within higher education may become a more pressing issue. At the present time, the CHE is in the process of deregulating program approval, especially for distance education programs. The CHE is also developing an appropriation policy document with respect to distance education.

■ *South Carolina Technical Education System*

The Technical and Comprehensive Education institutions offer technical skills-oriented education and general education, and operate as a single system under the State Board for Technical Education. Each college has its own board for individual governance. Because interactive distance learning is a recent development through the system's interactive video network, the technical college system is initiating distance learning policy and procedures. A distance education peer group is undertaking discussions and debates about key issues. The system also developed a strategic master plan for distance education. The plan was presented to the Board in the late spring of 1998.

■ *Department of Education (SCDOE)*

The state provides general direction for educational technology, as outlined in the *South Carolina State Technology Plan* adopted in November 1995. The state plan mandated the development of school and district technology plans, but left latitude to the school districts regarding both implementation and content development and use. The SCDOE makes resources available to promote the use of the technology in education. There are 13 regional District Service Offices, through which training is offered throughout the year.

■ *South Carolina Educational Television (SCETV)*

In 1960, the General Assembly created the SCETV Commission to initiate education via public broadcasting. SCETV is one of five public broadcasting centers in the U.S. that has a major involvement in educational technology and telecommunications. SCETV's mission is to provide a statewide educational communications network. The primary purpose is to provide educational opportunities to public schools, colleges, universities, and for adult continuing education.

SCETV provides a myriad of educational channels and outlets, serving homes and schools. Programs are delivered to the public through some 40 channels, including broadcasting channels, ITFS channels, and satellite channels. SCETV created a New Media Department to conform to the new broadcasting standard of digital system, which was implemented by the Federal Communication Commission in December 1996. The New Media Department was designed to manage delivery of instructional materials via a digital system to the public schools. One of New Media's Department initiatives is to develop a plan to deliver at least some of SCETV's 85,000 instructional video programs via Internet. Delivery of at least some of those programs via the Internet is slated for the fall of 1998.

THE DRIVING FORCE

■ *Statewide Infrastructure Planning*

Planning efforts for distance learning have been underway in South Carolina since 1994, when the State Budget and Control Board won an NTIA grant to develop an implementation plan for the South Carolina Information Highway (SCIway). The plan, called the *SCIway Blueprint*, was completed in December 1996. This activity sets the stage for improved current citizens' access enabled by technology in South Carolina. The South Carolina Information Infrastructure Assessment Program has documented the infrastructure in South Carolina, and will continue to be updated in the future.

The governor's interest in the development of South Carolina's information technology infrastructure resulted in the formation of the IRC and the TAC, as well as the state's K-12 Technology Initiative. The OIR and the SCETV play a powerful role in making resources available for educational purposes. As the IRC's various planning committees solidify, they will exert a greater influence on the state's coordination of infrastructure and programming.

THE PLANS

■ *Office of Information Resources (OIR)*

The Office of Information Resources is in the middle of several projects relating to development of infrastructure, including an eventual statewide migration to ATM technology to serve the state's voice, data, and video needs and SCETV. Nine pilot interactive video projects, funded at $3 million, originated from an OIR - BellSouth - SCETV partnership. These projects include video delivery systems using satellite technology, compressed video with speed below T-1, ATM, and CATV. Utilizing this funding, the South Carolina Governor's School for Science and Mathematics provides distance learning courses to five compressed video networks, and delivers them to SCETV for transmission via satellite.

■ ***K-12 Technology Initiative***

Legislation in 1996 created the K-12 Technology Initiative, which aims to implement technology for K-12 education. The four-year project provides funding for infrastructure, hardware acquisition, and training and professional development. The first-year funding of $20 million procured high-speed telecommunications access for schools and administrative offices via the state backbone, and through the backbone to the Internet. Dedicated lines, either 64Kb or T-1, depending on the number of workstations in a school, are being provided to every school in the state. Funds of $28 million in fiscal year 1997-98 finished the telecommunications connections and expanded the distance learning programs and capabilities run through SCETV. All secondary schools were connected through ITFS, and all schools were provided with digital satellite receivers. Financial support included teacher training credit and recertification courses in technology and its use as well. A total of $3.25 million was also earmarked to help provide for unmet needs in the poorest school districts

An anticipated amount of $14 million in third year funding will purchase computers and other electronic and technical equipment. Plans for the project in the coming years are to provide an adequate number of workstations, and extend the building wiring into all the classrooms. Traffic on the network is constantly being monitored, and connections will be upgraded as the number of computers in a given building increases. The school districts have assumed responsibility for providing the computers, hardware, and internal routers. The progress of the initiative is overseen by a technology committee, a legislatively mandated public-private partnership involving 26 telephone companies and BellSouth, the Budget and Control Board, DOE, and SCETV.

■ ***South Carolina Educational Television–Distance Learning Centers***

SCETV is establishing Distance Education Learning Centers to support distance learning classrooms and equipment. Twenty-one such centers, established 15-20 years ago for tape distribution of SCETV materials, have been converted and modernized. Twenty-eight sites are now completed, six more are under construction, and another four await funding. These Centers are supported by, managed by, and accessible to every school district, with overall planning, coordination, and central services provided by SCETV. The Centers house ITFS classrooms offering one way video and two way audio connections.

■ ***E-rate***

A state-level application is being filed for all dedicated lines and long distance telecommunications charges for Internet connectivity. Technical assistance and guidance are given for applications filed at the school district level, which will cover all local communication and other services. Because the state has required technology plans as part of the *South Carolina State Plan for Education Technology* and the K-12 Technology Initiative, schools and school districts are prepared for funding.

THE FUNDING SOURCES

■ Higher Education

Distance learning efforts receive funding at the same level as other academic programs—on a per-credit hour basis. Out-of-state tuition and fees are distance learning issues that the market may ultimately decide. The funding structure for higher education has been changed as a result of legislation passed in 1996; 100 percent of institutional funding will be based on 37 performance factors by 1999-2000. Because the higher education community has been grappling with how to deal with the changes in funding, the Commission on Higher Education has only recently turned its attention to distance learning planning and policies. One of those performance review factors is collaboration, which may encourage the institutions to work together, especially on distance education programs.

■ K-12

In addition to the $60 million already committed in the first three years of the K-12 Technology Initiative, the first year of the Technology Literacy Challenge Fund program distributed $2.5 million in competitive grants of $100,000 to support 25 projects. Seventy-five percent of those grants were issued to the state's poorest school districts. The remaining five to six grants were awarded at large to the best projects. It is anticipated that $5 million will be available for distribution in 1998.

TECHNOLOGY

■ Statewide Networks

SCINET is the collective term for all the state networks managed and operated by the Office of Information Resources. These networks are not integrated, but integration may occur in the near future through the migration to ATM technologies. The networks include: ❶ SNA network, which serves over 1200 locations at top speeds of 56 Kbps; ❷ frame relay –1.5 Mbps; ❸ connectionless data services (CDS), –1.5Mbps, which is actually an SMDS network; and ❹ Electronic Tandem Network (ETN) a voice network.

K-12 uses the CDS and frame relay networks via the connectivity established through the K-12 Technology Initiative. The 16 Technical Education institutions connect to the frame relay network via T-1 lines, using 768Kb for compressed video and 768Kb for data. Metronet, a 100Mb FDDI ring in the Columbia area, runs over multimode fiber. This ring serves as the Internet gateway for all SCINET connections and as a WAN bridge connecting the various parts of the different networks. The ATM switch will be installed on the ring sometime in 1998, and a second switch in Charleston will be installed in 1999.

■ South Carolina Educational Television (SCETV)

SCETV operates 32 digital satellite channels and eight microwave and ITFS channels, reaching over 1600 sites throughout the state. The ITFS sites serve as origination points for video that is then transmitted over satellite, and for interactive video applications.

A satellite dish with three receivers (one for each channel) exists at every middle school and high school in the state, and a dish and two receivers can be found at every elementary school. SCETV's efforts include more than 1150 school facilities, 46 sites at K-12 cooperative extension centers, and another 450-500 downlink sites at every public and private institution of higher learning. SCETV reach extends to 80 dishes for law enforcement and public services, 80 sites at businesses, and about 20 dishes at state agencies.

■ *University of South Carolina System*

The University of South Carolina System includes eight colleges: Columbia is the main research institution, Aiken and Spartanburg are four-year baccalaureate institutions, and five regional, two-year institutions serve as remote learning centers for graduate programs. Among the higher education institutions, USC-Columbia has been the most vigorous user of SCETV system. USC-Columbia offers master's degrees in Library and Information Science, Engineering and MBA programs through distance learning. Many of the courses offered at the 25 sites throughout the state originate from the professional schools. USC has developed an undergraduate completion program in business management and criminal justice, and is looking at the feasibility of programs for retail and hotel and restaurant management. Undergraduate offerings are print based. High school credit courses are also offered, mostly asynchronously as recorded video sessions. The distribution mechanisms, including print-based correspondence courses, include more than 10,000 enrollments per semester. There are over 50 courses offered per semester through electronic media.

USC offers its library program out of state through specific institutional agreements in Maine, West Virginia, and Georgia. Providing adequate program support is one of the main reasons limiting the graduate courses to just a few states. Although distance learning course offerings will not be expanded at USC, it will continue to offer needed programs in social work, nursing, and health. USC will focus efforts in the future on increasing the delivery of elective courses.

USC maintains a strong relationship with the technical colleges for use of the sites. Cooperative arrangements encompass course delivery rather than cooperatively offered programs. USC is considering degree completion programs for distribution among the regional campuses, and is looking at other states for appropriate models.

■ *Clemson University*

The distance learning program at Clemson University is at its infancy stage. The university offers some credit and non-credit courses via satellite. Clemson is in the planning stage to assess the market of distance learning.

■ *Medical University of South Carolina (MUSC)*

The Medical University of South Carolina has delivered instruction via satellite through its Health Communications Network for over 20 years. The University has its own uplink and downlink, and its programming has focused on continuing education for the medical community. The MUSC campus in Charlestown holds three distance education video conferencing rooms. The College of Health Professions and Nursing offers programs leading to a Bachelor's degree in Health Sciences, and other master's degrees. These classrooms also serve medicine and telemedicine, administrative, and videoconferencing needs. Compressed video at MUSC has only been in use since the spring of 1997. Fourteen courses were offered in the fall of 1997, ten during the spring of 1998, and 18 are scheduled for fall of 1998. The courses are transmitted to Francis Marion University, University Center in Greenville, and USC-Columbia. The University sees distance learning as one of the ways to bring itself into new areas to serve a more active statewide mission.

■ ***South Carolina Technical Education System***

The Technical Education System Interactive Video Network, operational since June 1996, now connects 25 sites, including all 16 Technical Colleges and some high schools. The network makes use of the state backbone, with institutional transmission over T-1 lines operating compressed video at 768 Kbps.

The system still offers few distance learning programs over the compressed video network; most take the form of sharing courses and instructors among the institutions, although the system also includes approximately 12 world wide web-based courses. K-12 collaborations take place within the technical colleges' local areas. For example, Trident Technical College collaborates with three high schools.

OTHER MISCELLANEOUS BUT RELEVANT INFORMATION

An executive order created the Technology Advisory Council (TAC) to oversee the development of a technology strategy for research and business development in South Carolina. The Office of Information Resources has also developed a proposal for the establishment of a Center for Applied Technology. Modeled loosely on the Center for Technology in Government at SUNY in Albany, New York, the Center would create partnerships to address the development of technology applications in government. The partnerships would also create a test environment for promising technologies and possible application to development.

■ ***PSC Docket for Statewide Universal Service***

The PSC opened a docket to establish guidelines for an Intrastate Universal Service Fund, its funding, management and size, which was to be finalized by August 1997 as set by SC Act 354. As of February 1998, however, no action has been taken.

South Carolina is participating in the Southern Regional Electronic Campus (SREC), established by the Southern Regional Education Board. Several institutions are offering courses through the SREC and two institutions are offering one degree program each.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

South Carolina's K-12 distance learning initiatives have always dwarfed the progress and success seen in the state's higher education projects. Although some institutions have made progress in their own distance learning planning and courses, higher education as a whole has not fully realized the opportunities offered by distance learning and educational technologies, in terms of reaching more students, developing more solid relationships with K-12 schools, and creating stronger partnerships with each other. The state's situation may change for the better as the Office of Information Resources assumes a greater role in providing leadership for infrastructure development and the higher education institutions recover from the restructuring of their funding.

SOUTH DAKOTA

ACRONYMS AND NETWORKS

- BHSU—Black Hills State University
- BIT—Bureau of Information and Telecommunications
- BOR—Board of Regents
- DECA—Department of Education and Cultural Affairs
- DSU—Dakota State University
- MTI—Mitchell Technical Institute
- NSU—Northern State University
- RDTN—Rural Development Telecommunications Network
- SDPB—South Dakota Public Broadcasting
- SDSM&T—South Dakota Schools of Mines and Technology
- SDSU—South Dakota State University
- TBSIP—Technology Based School Improvement Program
- TIE—Technology Innovations in Education
- USD—University of South Dakota

EXECUTIVE SUMMARY OF THE STATE

Through combinations of various delivery media, South Dakota's distance learning projects reach across the state. The Rural Development Telecommunications Network operates both satellite delivery and compressed video over the DS-3 backbone state telecommunications network. South Dakota Public Broadcasting also supports an extensive statewide network. Regional networks are still being established, and while there are no plans for their interconnectivity, the systems maintain open architectures to enable potential interoperability.

The state's Board of Regents encourage the six, state-funded universities to collaborate to serve educational needs. To this end, a new Off Campus Academic Program Delivery Council has been created.

K-12 education benefits from the Governor's Wiring the Schools initiative. This creative project uses inmate labor and state funding for hardware, with local support to lay internal building wiring in all schools. As the internal wiring is completed, the schools will assume responsibility for subsequent Internet connection. Working with locally based groups, the Technology Based School Improvement Program, which is overseen by the non-profit organization Technology Innovations in Education, implements technology planning.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The state's Rural Development Telecommunications Network (RDTN), which began in 1992, set the stage for the more recent collaboration seen among the state's universities. The RDTN also laid the groundwork for statewide telecommunications planning.

RDTN users can utilize the switched gateway access service and satellite network for videoconferences anywhere in the world. Available bandwidth range from 112 kbps to 384 kbps for interstate services and 768 kbps for intrastate dedicated services. RDTN has 16 fully interactive, two-way audio, two-way video sites available for public use. High school and college courses are available via distance learning. Such courses are offered by RDTN through satellite and the Internet. RDTN provides infrastructure, technology, and support services to six universities, three vocational schools, two hospitals and K-12 schools. In addition, RDTN offers such technology related services to state agencies.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Bureau of Information and Telecommunications (BIT)***

In 1996, Governor Janklow pushed for the consolidation of all information technology services in state government. Before that point, each state agency had its own PC support, applications, LANs and WANs, budgeting, and standards. The restructuring of the Bureau of Information and Telecommunications (BIT) brought all information technology services under one umbrella organization, established standards for all government systems, and enabled centralized purchasing and procurement of services, budgeting, and support. Although institutions of higher education provide their own support for academic computing, BIT carries out all their administrative computing. The consolidation used existing budgetary money, and the first year witnessed a surplus of $2.4 million, largely from personnel expenses. The BIT administers both the Rural Development Telecommunications Network and South Dakota Public Broadcasting.

■ ***Board of Regents (BOR)***

The South Dakota Board of Regents is the governing and coordinating board for South Dakota's six, state-funded institutions of higher education. There are no community colleges in South Dakota. In 1992, the Board of Regents adopted an off-campus delivery policy, which did not impose any obstacles to the delivery of distance learning. In January 1997, the BOR created an Off-Campus Academic Delivery Council to coordinate the delivery of off-campus programs.

■ ***Department of Education and Cultural Affairs (DECA)/ Technology Innovations in Education (TIE)***

Technology Innovations in Education (TIE) is a non-profit organization providing leadership and technical assistance to all schools in South Dakota. TIE began in 1986 as a Department of Education and Cultural Affairs sponsored project, but now has become an extension administered by an intermediate education agency and works in close partnership with DECA. TIE assumes responsibility for all aspects of technology implementation in the schools, including initiation, applications, integration, professional development, acquisition, and planning. Funding for TIE projects varies from year to year, depending on needs delineated by DECA, federal technology funding, and partnerships with businesses. TIE oversees the Technology Based School Improvement Program, a focus of K-12 technology efforts in South Dakota.

THE DRIVING FORCE

Governor Bill Janklow has aggressively pushed for many of the technology and telecommunications programs undertaken in the state of South Dakota, such as the restructuring of the state's Bureau of Information and Telecommunications, the Electronic Classroom for higher education, the Wiring the Schools project, joint venture projects within communities, and the development of public-private partnerships for telecommunications backbone frame relay connections.

Collaborative efforts among the universities began with the establishment of the Rural Development Telecommunications Network in 1992. More recently, institutions of higher education have focused on increased collaboration through the establishment of the Off Campus Academic Program Delivery Council. This recent activity, as well as the Board or Regents' on-going attempts to create a more unified approach to the state's higher educational system, contrast markedly with the independent activities and avoidance of statewide initiatives seen in past years.

THE PLANS

■ Legislation

House Bill HR 1227, approved in the 1996 legislative session, provides a policy to guide and direct the creation of a new and advanced telecommunications infrastructure across South Dakota. The intent of the legislation is to set guideline provisions for a public communications network infrastructure including narrowband, wideband, and broadband transports in a fully switched and secure communications environment.

■ Bureau of Information and Telecommunications' Joint Ventures

Joint ventures involving the state working in conjunction with cities, counties, and schools will provide voice, video, and data services over the state telecommunications network. These partnerships allow the state to negotiate better prices on services, create a larger user base, and demonstrate savings of up to and greater than 50 percent. The state backbone connecting the 13 major population centers in the state offers significant savings to the partnerships. A number of joint venture agreements have been in place for the last three to four years, and their numbers continue to expand.

A public-private partnership involving USWest and the independent telephone companies in the state may eventually provide frame relay service connections to the statewide network. The cost of a dedicated line to the backbone is higher than current rates for frame-relay. Most of the connections to the backbone are currently via dedicated connections.

■ Governor's Electronic Classroom

The Governor's Electronic Classroom program installed a computer and video-conferencing classroom in each of the state's six universities. The computer-oriented classroom was intended to facilitate collaborative learning. The compressed video uses ISDN dial-up connections.

■ *Higher Education*

The Board of Regents' (BOR) Off Campus Academic Program Delivery Council, created in January 1997 after one year of planning, consists of one BOR member, one representative from each of the six, state institutions, and one representative from each of the institutional centers at Sioux Falls and Pierre; it is facilitated by members of the Board staff. This council actively coordinates all off campus delivery of distance education courses, and has outlined a five-year plan for the statewide delivery of courses. The council has instituted a five-year course rotation schedule in order to maximize resources and eliminate duplicative efforts among the institutions. The schedule supports each school's ability to offer its own courses instead of courses offered by other institutions. The five-year plan was finalized at the end of March 1998.

South Dakota revised funding mechanisms for higher education, and replaced the FTE funding formula with base and incentive funding policies. Incentive funding is now based on five factors. Of these factors, two promise to be of importance to distance learning in the state: access for South Dakota residents and collaboration.

■ *Technology Based School Improvement Program*

The Technology Based School Improvement Program (TBSIP) includes funding for the Technology Literacy Challenge Fund, Goals 2000, and a portion of state appropriations. The state makes these monies available to school districts on a competitive basis in the form of planning grants, implementation grants, or professional development grants, depending on the desire of the school and district. Several million dollars are available per year as part of the TBSIP.

■ *Wiring the Schools (WTS)*

The Wiring the Schools project began in the fall of 1996 as a partnership led by the governor's office, the non-profit organization Technology Innovations in Education, and Dakota State University. The initiative uses inmate labor to install electrical and LAN network infrastructure in each of South Dakota's schools. Three drops are being installed for every four students in a given school. Typically, a school will receive six drops in each classroom, and one for each computer in the labs, library media centers, administrative offices, and teacher work centers. The state legislature appropriated money for installing this internal wiring infrastructure, while schools assume responsibility for providing computers, hubs, routers, and servers, as well as Internet and telecommunications services. Work in all schools should be completed by the end of 1998.

The final component of the Wiring the Schools project is to install T-1 connections at each school. As the original program does not support this or actual connectivity to the Internet, a new Connecting the Schools project will seek to provide some or all of the hardware required within the school building and classrooms, as well as the Internet connectivity.

The Governor's office concentrates on making technology available to schools. As part of their participation in the project, Technology Innovations in Education and Dakota State offer training programs. In the summer of 1997, Dakota State University began offering an academy for training teachers, Technology To Teach and Learn (TTL). The four-week session focuses on the pedagogy of using technology to enhance learning. TTL is scheduled to continue through 1999, by which time it will have trained 20 percent of all classroom teachers in South Dakota.

■ *E-rate*

School districts work on their own E-rate applications. Technology Innovations in Education and the Department of Education and Cultural Affairs host workshops for information dissemination and offer preparation assistance. Technology plans required as part of the state's Technology Based School Improvement Program put the schools in a good position for the E-rate applications.

THE FUNDING SOURCES

The state has invested $13 million in technology and telecommunications efforts over the last three years.

TECHNOLOGY

■ *State Telecommunications Network*

The State Telecommunications Network is a leased DS-3 backbone network offering data, voice, and video. The compressed video portion of the Rural Development Telecommunications Network is carried over the state telecommunications network.

■ *Rural Development Telecommunications Network (RDTN)*

The Rural Development Telecommunications Network (RDTN) is a statewide satellite and compressed video network. The 72 satellite C-band and digital downlinks throughout the state are located predominantly at high schools, with fixed and mobile Ku-band analog, and fixed digital C-band uplink. Approximately 80 other satellite downlink sites throughout the state can be found at non-public sites or at health education network sites. The compressed video network runs over leased T-1 lines to 14 higher education and hospital sites. Higher education institutions, state government agencies, and the health care industry primarily use this network, which operates at a 768 Kbps transmission speed. Satellite network operations have been outsourced by the Bureau of Information and Telecommunications to MTI Telecom, a division of the Mitchell Technical Institute. Satellite connections are able to roll out into another 35 local cable networks. The terrestrial network is operated by the state.

■ ***South Dakota Public Broadcasting (SDPB)***

South Dakota Public Broadcasting provides 40 hours each week of classroom programming for K-12, including field trips, professional development, and workshops on the use of instructional television. SDPB also broadcasts 25.5 hours of college telecourses each week, including live interactive sessions for USD. The combined resources of SDPB and RDTN enable 14,000 students each semester to participate in distance learning courses.

■ ***Local Networks***

Several local area interactive video networks exist throughout South Dakota. The Sanborn Interactive Video Network is an analog fiber network, transmitting two-way interactive full motion video to seven high schools, a hospital, and a university. The North Central Area Interconnect is a consortium of area high schools, a private college, and a state university linked by an ITFS and fiber two way interactive system in the northeastern area of the state. The East Central Interconnect and South East Distance Learning Network are both due to be operational in the fall of 1998. These operations are funded through a pooling of regional funds, partnerships, and grants. Open architecture is maintained to enable the interconnectivity of these networks when it is economically and programmatically desirable and feasible.

■ ***Higher Education***

The Off Campus Academic Delivery Council compiled a list of distance learning courses, which includes one approved graduate MBA program offered out of the University of South Dakota. Another program to be made available to five other states is in the process of approval. Several bachelor's level courses use distance learning for instruction. Three universities offer a cooperative French major using telecommunications. DSU's English for Information Systems major has been approved for Internet delivery by the BOR and is awaiting accrediting association approval.

Cooperative scheduling for the statewide RDTN network contributes to collaborative efforts among the universities. Discussions and agreements worked out among the universities for accepting credits also support collaboration across the institutions, as do cable and local ISDN arrangements and work with high schools. The universities offer shared courses and programs via two way interactive video, and academic credit can be issued by any of the participating universities. In a rotating system, one of the six universities hosts monthly workshops that provide technology training. A number of institutions are engaged in producing distance learning courses to high schools, delivered over the satellite system.

Dakota State focuses on the Internet as a means of delivery; South Dakota State University has a large extension program and off campus nursing program; Northern State is expanding correspondence courses; and the School of Mines and Technology offers engineering and relies on a tape distribution system.

■ ***Dakota State University (DSU)***

Dakota State University focuses its distance learning development efforts on online courses. DSU initiated online course development in 1991, and adopted it as part of its formal distance learning efforts in 1996. The university offered 22 courses via the Web in 1997-98, and 28 will be fully developed by the 1998-99 school year. DSU's English for Information Systems bachelor's course awaits accreditation approval; DSU intends to seek BOR approval to deliver a variety of programs using the Internet. Efforts are to target both bachelor's and master's degrees in information systems, for which DSU has been designated the Center of Excellence.

■ ***South Dakota State University (SDSU)***

Three years prior to RDTN's founding in 1992, South Dakota State University's interactive video courses included a closed circuit connection with a site in Pierre. Currently, RDTN offers six to ten courses per semester. Language classes are offered through the Governor's Electronic Classroom, and local cable transmits five other classes using two-way audio interaction to six community sites. SDSU is exploring Internet delivered courses, and anticipates that in the fall of 1998 it will offer five Internet-based courses and an additional 55 courses within eighteen months. SDSU does not embrace a single mode of delivery. Instead, it uses the technologies available to meet the educational needs of the courses.

The East Central Interconnect links SDSU with six area high schools. Pending a decision for a cable expansion grant, 40 channels will be available to 52 sites for two-way interactive video applications with high schools. Another I-29/I-90 Interconnect project will connect six to eight high schools in the Sioux Falls area via ISDN compressed video (PictureTel) dial-up.

■ ***University of South Dakota (USD)***

USD offers approximately 60 independent study and correspondence courses per semester, and is designing another 30 courses. USD has created five Internet-based courses and is working on an additional 20. These Internet courses are both synchronous and asynchronous, use chat sessions for interactivity, and will rely on desktop video as the technology matures.

The University of South Dakota is developing the "Going the Distance" program for an AS/AA degree, which will be broadcast over South Dakota Public Television and will allow any student who completes the course to matriculate for the final two years at any of the state institutions in South Dakota. SDPB is also in the process of expanding its educational services to the world wide web.

■ ***K-12***

Much of the universities' collaborations with K-12 involved three types of programs: ❶ university courses offered so that high school students can earn both high school and university credits; ❷ enhancing high school curriculum; and ❸ community and economic development courses offered through the satellites at the high schools. The K-12 community also makes use of SDPB programming, as well as programming originating in the four local area interactive video networks.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

South Dakota illustrates the possibilities attainable in a short time frame with the support of the governor and legislature, and creative planning. Unlike the state's past dedication to independent planning, South Dakota is moving rapidly on collaborative initiatives, especially in the higher education sector. With no community college system responsible for meeting the state's general education needs, higher education institutions have stepped in to address this critical area. Without considerable communication and collaboration, duplication of efforts could easily result.

TENNESSEE

ACRONYMS AND NETWORKS

- ConnecTEN
- OIR—Office for Information Resources
- Tennessee Board of Regents
- THEC—Tennessee Higher Education Commission
- TNII—Tennessee Information Infrastructure
- UT—University of Tennessee

EXECUTIVE SUMMARY OF THE STATE

Tennessee has established the groundwork for successful integration of three data and video networks operating in the state. The Tennessee Information Infrastructure (TNII) initiative, several years in the planning, combines the services of the statewide data network, the Tennessee Board of Regents, and the University of Tennessee networks. The anticipated result will be a robust network serving the data, voice, and video needs of the three participants and the state. Public higher education institutions in the state are beginning to consider the development and necessity of coordinated distance learning policies and planning, and the University of Tennessee system and Board of Regents system have monitored the distance learning programs taking place on their respective campuses. The Department of Education has concentrated its efforts on the Internet and its use. As a result of the ConnecTEN initiative, the first phase of the TNII, all 1,560 public schools in the state have had access to the Internet since 1996.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The TNII attempts to create a seamless statewide network, a task that faces obstacles stemming from the independent growth of two of the three networks it incorporates. The networks of both the University of Tennessee and the Tennessee Board of Regents developed to meet the needs of the institutions' defined service areas. Interactive video sites were established on campuses on an ad hoc basis, using the most cost effective delivery method, with little concern for compatibility.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Tennessee Information Infrastructure (TNII)***

Planning for the TNII is a collaborative undertaking. The TNII is overseen by an executive committee whose members include the University of Tennessee, the Tennessee Board of Regents, the Tennessee Department of Economic and Community Development, and the state Office for Information Resources. The TNII's steering committee includes representatives from the executive committee and from public libraries, local governments, community networks, and the State Department of Education. In addition, some 14 task forces were formed which focused on issues related to higher education administration and instruction, higher education research, higher education outreach and extension, adult basic education, and K-12 administration and instruction, among other topics.

■ ***Office for Information Resources***

The Office for Information Resources (OIR) provides direction, planning, resources, and coordination in managing the information systems needs of the state of Tennessee. OIR is a division within the Department of Finance and Administration. OIR's clients primarily consist of state agencies, departments, and commissions. OIR serves as staff to the Information Systems Council (ISC), and under the ISC's guidance, provides technical direction, services, and infrastructure to the state of Tennessee.

■ ***Tennessee Higher Education Commission (THEC)***

The Tennessee Higher Education Commission (THEC) coordinates the state's two systems of higher education, the Tennessee Board of Regents (TBR) system and the University of Tennessee (UT) system. THEC's main role is to minimize duplication of programs and assure that the educational needs of students are met. In the past, THEC has permitted the TBR and UT systems to maintain their own distance learning programs, and has subjected the distance learning degree programs to the same approval criteria as those of traditionally delivered programs. The THEC is planning to develop policies specifically for distance learning and is considering its role in coordinating distance learning efforts.

■ ***Tennessee Board of Regents (TBR)***

The 18-member Tennessee Board of Regents governs and manages the institutions comprising its system, including six regional universities, 14 two-year community colleges, and 26 technology centers (vocational technical schools). The Board's policies and practices reflect decentralized decision-making and operations. Standardized policies are established to ensure institutional accountability, while maintaining campus prerogatives. The Board maintains a strong committee structure through which all policies and other significant considerations are deliberated. With regard to distance learning, the Board strives to maintain the same quality of instruction and service for on- and off-campus instruction, a concern that the Board's Distance Education Committee addresses. Tennessee Board of Regents institutions work within the confines of their designated service areas in developing the infrastructure and delivering distance learning courses.

■ ***University of Tennessee (UT)***

The University of Tennessee system includes seven institutions: four main, degree-granting campuses, the ET Space Institute, the Institute for Agriculture, and the Institute for Public Service. UT strives to offer via distance learning specialized courses at the graduate level. The University of Tennessee has established the system wide Distance Learning Council and the Educational Network (EDNET) to coordinate and support the distance learning programs of the respective campuses and institutions. Although each of the four main campuses in University of Tennessee has their individual programs and courses that it offers to students, they are connected by the statewide system of EDNET.

■ ***Tennessee State Department of Education***

Within the State Department of Education (SDE), the Office of Technology advocates, advances, assists, and supports the appropriate use of technology to address the business functions and educational goals of the Department of Education and Tennessee's schools, by establishing a technology framework providing timely access to information, and through effective management of technology resources. The Office of Technology is responsible for planning, developing, installing, and maintaining the Department of Education's technological environment, and managing the Department of Education's Technology Resources.

THE DRIVING FORCE

Institutional and system wide recognition of the educational necessity of distance learning has fueled efforts in higher education. Because the state has not increased allocations to promote the development of distance learning, institutions have had to readjust their own funding and realign resources to develop programs and infrastructure on their own.

THE PLANS

■ ***Tennessee Information Infrastructure (TNII)***

The Tennessee Information Infrastructure (TNII) represents an effort to consolidate three existing public networks in the state—those maintained by the state, the Tennessee Board of Regents, and the University of Tennessee—into a network of networks for education, healthcare, libraries, government, and community services. In 1994, a 15-month planning period commenced, supported by a Telecommunications and Information Infrastructure Assistance Program (TIIAP) grant. Plans for the TNII are complete, and a Request For Proposals has been issued for its implementation.

■ ***K-12***

Most statewide technology activity for K-12 schools has focused on Internet use. Through its ConnecTEN project, the State Department of Education (SDE) is providing all teachers and students in the state with full graphic access to the Internet. Prior to 1996, all schools had Internet access via dial-up modem, but this capability provided text-only access. ConnecTEN is the governor's initiative to connect all of Tennessee's 1,560 elementary and secondary public schools to the Internet. Planning for ConnecTEN began in 1995, and initial teams of teachers in each school district participated in a pilot program during April and May of 1996. County equipment was installed by July 1996, while school system and school equipment was ordered and installed on a timeline that began in May 1996. All teachers and students gained access to the Internet beginning with the 1996-97 school year. Management responsibilities for the design and implementation of ConnecTEN were assigned to the

Tennessee Office for Information Resources as part of the TNII project, and ConnecTEN represents Phase I of the TNII implementation.

The State Department of Education (SDE) is also undertaking a curriculum project to compile 400 teacher developed units into a searchable, useful web resource. The database will be continually expanded and updated to fit the growing technology needs of teachers.

The Tennessee State Department of Education (SDE) has established new objectives for Internet use among teachers and students. For the 1997-98 school year, the objective was for every Tennessee student and teacher to have one hour per week of access to the Internet. Two related objectives are for every teacher to have access to modules on the Internet to facilitate their professional development during the 1997-98 school year, and for every teacher to have access to curricular modules to facilitate integrating the Internet into the curriculum. Eventually, the SDE intends to reach the goal of three hours of weekly Internet use for each student.

■ ***E-rate***

Tennessee's E-rate efforts focused on expanding and enhancing connectivity to and bandwidth of ConnecTEN. Schools completed their own applications for funding, while the State Department of Education served in an advisory capacity.

■ ***Higher Education***

■ ***Tennessee Board of Regents (TBR) Institutions***

The TBR's DistanceEducation Committee is developing Long Range Plan on Distance Education, a statewide plan for delivery of distance learning courses. The plan focuses on the options for connecting and managing its 20 key institutions' use of the Tennessee Information Infrastructure. Currently, the TBR institutions include over 14,000 enrollments in 644 sections of interactive television, Internet, and video courses. More than one-quarter of the students enroll in interactive video courses, while another 500 students take a course via the Internet. More than one-half of the courses are distributed through videotape and cable television.

■ ***University of Tennessee***

UT's network offers 30 primarily graduate level courses each semester. During the period between the fall of 1993 and the summer of 1997, the UT network delivered 344 courses to more than 8,600 students. All courses are distributed within the state, with the exception of information sciences courses that are delivered to four sites in Virginia. The network does not offer asynchronous courses, nor does it distribute courses from other institutions as a rule.

■ ***Tennessee Online Community College Consortium***

Four community colleges in eastern Tennessee are cooperating to develop courses that will be the basis for an online degree, a plan that is in its initial stage. Roane State Community College, Pellissippi State Tech Community College, Cleveland State Community College, and Chattanooga State Community College form the Tennessee Online Community College Consortium (TOCCC).

THE FUNDING SOURCES

■ ***K-12***

The Tennessee Department of Education allocated \$5.6 million for the hardware and installation expense necessary to bring the Internet connections from the state information system's county access points to every school site. This amount includes \$3.6 million in technology allocations, \$1 million from departmental savings, and \$1 million in commitments from education's business partners. The state Department of Education and each local school system, as of July 1, 1996, shares recurring costs, using the Basic Education Program (BEP) distribution formula based on student population. In general, the state will average 75 percent of the funding, with local school systems providing 25 percent.

Tennessee has also received federal funding to support its technology projects. In 1997, the Tennessee state Department of Education received \$3.4 million in Technology Literacy Challenge Fund grants. In 1998, Tennessee received \$6 million in Technology Learning Challenge Funds. Tennessee's Literacy Grant set forth objectives building on the ConnecTEN project. The state Department of Education will use schools' connectivity rate along with their free and reduced lunch percentage to determine the priorities for spending the Technology Literacy Challenge Fund award.

Tennessee has consistently received Goals 2000 funds to support its ConnecTEN project. During the 1994-95 school year, Tennessee received approximately \$6.4 million in Goals 2000 funds. The majority of the funds were spent on ConnecTEN. The state received Goals funds of approximately \$6 million during 1996-1997. Approximately \$200,000 from each grant round was awarded to student-initiated projects.

■ ***Higher Education***

A \$25 million state appropriation enabled the Office of Information Resources (OIR), University of Tennessee (UT), and Tennessee Board of Regents (TBR) to create the statewide infrastructure which connects OIR to 95 county access points and six backbone regional hubs. Telephone company rate payers contributed \$400 million to digitize the telephone system. More than \$100 million in state appropriations from the legislature have provided 21st Century Classrooms, technology coordinators for school systems, and one computer in every school library. The planning process for the TNII was supported by a 1994 grant for \$375,000 from the Telecommunications and Information Infrastructure Assistance Program, which the state matched with cash and in-kind contributions.

TECHNOLOGY

■ *Tennessee Information Infrastructure (TNII)/ConnecTEN*

The TNII consists of backbone nodes located in six major Tennessee cities: Nashville, Knoxville, Memphis, Chattanooga, Jackson, and Johnson City. The nodes are connected via numerous T-1 lines. TNII Access Points (TAPs) are located in each of the counties not covered by a backbone node and provide connecting points for local networks as well as dial-in connectivity. Initially, these will be located predominately in UT and TBR sites, and in public libraries. Tennessee's schools have immediate access to the Internet through their own routers. All of the school connections (routers), education county routers (ECRs), and county access points (TAPs) are connected through one of six hubs to a central server in Nashville that provides the gateways to the Internet. The routers are connected with Bell South's high speed ISDN telephone lines. The Tennessee Department of Military, the Tennessee Military Academy National Guard Education Center in Smyrna, and the Tennessee Army National Guard units provided facilities and assisted the Tennessee Department of Education with computer installation and software demonstrations.

■ *University of Tennessee Educational Network (UT EDNET)*

The Educational Network (UT EDNET) is charged with developing and maintaining the infrastructure required to enable the distribution of interactive video, audio, and data signals for distance learning application. UT EDNET is a partnership of the University of Tennessee's campuses and institutions. UT EDNET includes 24 sites located throughout the state. It maintains interactive video connectivity among the campuses, primarily by the use of T-1 telephone lines. Nearly 200 credit and non-credit courses are conducted using UT EDNET, with over 3,500 students participating.

■ *Tennessee Board of Regents TECNet*

The TBR operates TECNet, the Tennessee Education Cooperative Network. TECNet is a data network connecting the 20 two- and four-year institutions in the TBR system via T-1 lines. The network is occasionally used for video as well, at one-quarter T-1 transmissions of compressed video. Individual TBR institutions have developed their own videoconferencing networks in their respective service areas, using dial-up ISDN connections to the BVCS-Bell Conferencing System and MCU bridges throughout the state.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Like many other states, Tennessee recognized several years ago that a virtual statewide network was developing by default through the collective efforts of its systems of higher education and public K-12 schools. Despite the fact that the state's technology resources were rapidly advancing, it was clear even then that true statewide connectivity would not result without some kind of concerted, deliberate intervention. Many individuals associated with collaborative planning for statewide educational technology and telecommunications can attest to the fact that the process is rarely straightforward and often frustrating, and the situation with the Tennessee Information Infrastructure is no exception. Tennessee's planners understand, however, that the alternative to coordinated planning is an assortment of expensive, redundant, independently operating networks, which creates a powerful incentive to align institutional and state resources.

TEXAS

ACRONYMS AND NETWORKS

- DIR—Department of Information Resources
- ITAC—Instructional Telecommunications Advisory Committee
- RESCs—Regional Education Service Centers
- SCATE—Southwest Center for Advanced Technology Education
- SLC—Schools and Libraries Corporation
- TEA—Texas Education Agency
- TETN—Texas Education Telecommunications Network
- THECB—Texas Higher Education Coordinating Board
- TIF—Telecommunications Infrastructure Fund
- TSD—Telecommunications Services Division

EXECUTIVE SUMMARY OF THE STATE

Texas is looking towards technology to help the state prepare for an expected 250,000 additional students who will participate in its K-12 and higher education institutions during the first years of the next century. With regard to K-12 initiatives, the state is fortunate in that it has a ten-year history of legislation and funding for instructional technology and telecommunications. In order for Texas to meet the expected challenges to its K-12 education system, the state intends to continue its strategic planning process, and its Commissioner's Access Initiative is likely to play a key role. The state's higher education institutions also focus on enhancing the use of technology. To this end, the Texas Higher Education Coordinating Board is in the process of revising its distance learning policies, which may lead to greater cooperation among the state's universities and colleges.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Texas' strength in educational telecommunications, historically, has been located in the K-12 education sector. The state has been building its K-12 infrastructure and expertise in educational telecommunications since the late 1980s. The 74th session of the state legislature passed House Bill 2128, a telecommunications bill, which took effect in September 1995 and authorized the creation of the Telecommunications Infrastructure Fund (TIF). At that time, the TIF represented the largest single yearly commitment to educational telecommunications in the country—$150 million per year for all K-12 schools, higher education institutions, and health care entities. One-half of the money for the TIF was to have been contributed by the state's cellular carriers, while the local exchange carriers and integrated exchange carriers would provide the other half. Commercial mobile service representatives, however, successfully challenged the constitutionality of HB 2128, and the 75th legislative session modified the TIF via Senate Bill 249, which set a cap of $1.5 billion for the ten-year life of the fund.

Interestingly, although the Dallas County Community College District has operated one of the longest-running distance education programs in the country, the state's higher education institutions have not been as proactive in planning for educational telecommunications as the K-12 education sector. Texas' public institutions of higher learning have traditionally existed as geographic centers of influence. Because distance education challenges geographic boundaries, the state's higher education institutions have been rethinking the "expansion of authority" clauses that limit the delivery of courses outside an institution's service area. Also contributing to the independent nature of higher education planning is the fact that the institutions must design and construct their own networks. The inevitable result of this is that much of the network development in Texas has been in the form of infrastructures local to a particular institution, rather than suited to multi-institution collaboration. Higher education institutions may be exerting a renewed interest in coordinating educational telecommunications activities. House Bill 85 of the 74th legislative session directed the Higher Education Coordinating Board to formulate a distance learning master plan. The plan, which was presented in July 1996, addressed (among other issues) the coordination and integration of distance learning among higher education institutions, training of faculty and staff, funding policies, and needs assessment.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Telecommunications Planning Group (TPG)***

The Telecommunications Planning Group is a legislatively created group, which is charged with shaping telecommunications policy for the state of Texas. The group consists of representatives from the Comptroller of Public Account (CPA), the Department of Information Resources (DIR), and the General Services Commission. Other state agencies, colleges and universities serve in an advisory board role in TPG.

■ ***Texas Education Agency (TEA)***

The Texas Education Agency relies on educational telecommunications as a key mechanism in facilitating communication among the state's public schools and providing access to quality educational programs for the state's underserved populations. TEA receives $14.6 million per year from the TIF fund. The money is used to implement the *State Board of Education's Long-Range Plan for Technology.*

■ ***Texas Higher Education Coordinating Board (THECB)***

The THECB governs the delivery of education throughout the state's institutional systems. The Instructional Telecommunications Advisory Committee (ITAC) has been involved in THECB's distance learning policy and planning activities since the mid-1980s. ITAC fulfills two primary roles. First, ITAC approves the distance education plans of every public higher education institution involved in distance education. Second, ITAC provides advice on telecommunications issues to THECB staff.

Pursuant to Chapter 5 Subchapter H in the rules and regulations, THECB provides guidelines for distance learning to public colleges and universities in Texas. Each institution seeking first-time authority to offer distance learning instruction via telecommunications technology must submit an *Instructional Plan for Instructional Telecommunications* for review and approval by the THECB. Criteria for distance learning have been outline by the THECB to ensure that all the students receive the same high quality of education. The THECB met to propose an amendment to the existing rules and regulations regarding distance learning. The proposal recommends a more flexible approach to allowing institutions to incorporate distance learning into their curricula.

■ ***Alliance for Higher Education***

The Alliance for Higher Education is a voluntary, not-for-profit consortium comprised of 33 colleges and universities, 35 corporations, and the Dallas and Fort Worth Public Libraries. For the past 33 years, the Alliance has operated the TAGER Television Network. Originally, TAGER offered graduate level engineering, computer science, and business degrees via its one-way video, two-way audio system. Today, students can choose courses to complete an Associate's, Bachelor's, or Master's degree. A number of non-credit courses are also offered.

■ ***Southwest Center for Advanced Technology Education***

A consortium originally made up of Texas Tech University, University of Houston, Amarillo College, South Plains College, and Texas State Technical College, the Southwest Center for Advanced Technology Education (SCATE) now includes a total of fourteen institutions. SCATE is supported through an Advanced Technological Education Program grant from the National Science Foundation, and is in its third year of existence. The consortium provides advanced technical education at a distance. One of its members, South Plains, connects with 13 other institutions through its distance learning classroom and works with three other consortia in its area.

■ ***Texas Association of Community Colleges***

The Texas Association of Community Colleges is composed of the presidents of the 52 community colleges in the state. Working with the association is the Texas Administrators of Continuing Education, which develops curricula for courses offered at a distance. The administrators are planning to use satellite as the delivery mechanism, as most community colleges in the state have access to satellite.

■ ***Central Services Commission's Telecommunications Services Division***

The Telecommunications Services Division (TSD) supplies telecommunications services for many K-12 schools in Texas. TSD provides technical resources and support services to the schools, and video-conferencing. Over 1000 K-12 schools are connected by TSD. The TSD assists in the implementation of the *Texas Long-Range Plan for Technology, 1996-2012*, which guides all the schools in the state in the implementation of technology in education.

THE DRIVING FORCE

Legislation and the promise of a larger student population contribute to the state's vigorous educational telecommunications planning and activity. Unlike the situation in a number of other states, Texas' educational telecommunications and technology progress has benefited from legislation over the last ten years that has provided sorely needed funds to support planning activities and demonstration projects, especially in K-12 education. The planning attempts by the Texas Higher Education Coordinating Board to create a collaborative atmosphere for distance learning among the state's higher education institutions may lead to increased opportunities for distance education in the state's adult population, as well.

THE PLANS

■ K-12

With its Commissioner's Access Initiative, the Texas Education Agency (TEA) is focusing its efforts on designing a study to evaluate the costs and benefits of using computer networks, including the Internet, in the public schools. Under Senate Bill 294 from the state's 75th legislative session, the commissioner of education was directed to appoint an advisory committee to study issues such as delivering updated supplements to state-adopted textbooks via a computer network. Committee members were selected in the early fall of 1997 and the study itself will be conducted in the fall of 1998. The results of the study will be reported to the state legislature by February 1, 1999.

Senate Bill 249, another piece of legislation that exerted a strong effect on K-12 education, resulted in the establishment of two accounts in the state's Telecommunications Infrastructure Fund (TIF), one for public schools and the other for qualifying entities. The money in the public schools account will be used to award grants and loans to fund equipment purchases and wiring. In addition, SB 249 requires the TIF board to adopt a master plan for infrastructure development. The master plan will cover a five-year period and will be updated annually.

Many of the state's K-12 educational telecommunications activities stem from its 20 Regional Education Service Centers (RESCs). The RESCs cooperate with the Telecommunications Infrastructure Fund (TIF) board in developing and offering telecommunications and technology training in all of the regions which have received TIF grants. The RESCs independently offer a variety of distance learning programming and services. All of the RESCs are in the process of planning and installing telecommunications networks in coordination with the Commissioner's Access Initiative. For example, Region 10 has developed EdNet, a data network linking 90 school districts in eight northern Texas counties via dedicated T-1 connections. The network is operated by the participating school districts. Region 10 is also installing compressed videoconferencing capabilities to be run across the network. Initially, this activity will include 14 sites, with at least one site in each county.

Public schools in Texas have been enthusiastic users of programming supplied by multi-state and in-state distance education providers. The state has been involved in Star Schools projects from the federal program's inception in the late 1980s. Texas is part of the United Star Distance Learning Consortium, which includes Florida, North Carolina, Illinois, and New Mexico. USDLC broadcasts programming via StarNet from region 20 ESC in San Antonio. The University of Texas Extension College's Educational Instructional Materials Center also offers telecourses to K-12 students, as does Texas Tech University.

■ ***E-Rate***

Texas State Board of Education's Long Range Plan for Technology focuses on four key areas: teaching and learning, educator preparation and development, administration and support services, and infrastructure for technology. The plan also focuses on providing voice, video, and data capabilities and ensuring equitable access to all districts and campuses. E-rate discounts will assist Texas districts in implementing the Long-Range plan.

■ ***University of Texas (UT)***

The UT System is governed by a Board of Regents, but each of the nine general academic and six health-related components act as separate institutions and are responsible for their own programmatic and academic decisions, as well as distance learning programs. The UT System is refining plans for a centralized brokering system called the UT Telecampus, which stemmed from a study conducted in 1996 by Anderson Consulting. The UT Telecampus will be a web-based, central source for course offerings and student services in distance learning for the UT System. In January 1997, the UT system finalized a master plan outlining the integration of distance learning offerings to fit UT's needs. In its current form, the TeleCampus has operated since the spring of 1998. In addition to offering courses and student services, the UT Telecampus will also assist faculty members in developing materials for use with the medium and provide a centralized link to the library services.

■ ***University of Houston***

The University of Houston (UH) System consists of a main campus, a downtown campus, and campuses at Clear Lake and Victoria. The UH main campus provides seven sites in the greater metropolitan area with approximately 85 live, interactive junior, senior, and graduate level courses via ITFS technology. UH offers degree programs to both students and corporate partners. Distance education remains one of the top agenda items of UH's new president and system chancellor.

■ ***Texas Tech University (TTU)***

Texas Tech University (TTU) includes more than 50,000 distance learning students. TTU's distance learning courses assume all forms, from traditional, print based materials to Internet distributed courses. In the fall of 1996, TTU articulated a vision for distance learning, which positioned the university as a national resource for education-related information. Texas

Tech University's Division of Extended Learning offers more than 200 courses to students throughout the United States and in 16 other countries. Another component of TTU's distance learning efforts is the health sciences courses offered through its Health Sciences Center (TTUHSC). TTUHSC operates HealthNet, a network providing education and health care services to residents that live in the 135,000 square mile, 108-county region of West Texas. TTUHSC is widely regarded as one of the finest, most comprehensive networks for health care professionals in the country. TTU is currently exploring the development of Internet courses to complement its other distance learning initiatives.

■ ***Texas A&M University***

Texas A&M, a land grant institution whose mission includes serving all parts of the state, is well suited for distance education. The Texas A&M System has 17 members, including eight, four-year, degree granting institutions and state agencies. The largest of the eight, Texas A&M University, has 43,000 students. Texas A&M delivers 150 to 170 courses per year over its compressed video network. More recent additions to Texas A&M's network include web-based and other delivery mechanisms, but these have been used to a limited extent to date. A degree program in Life Cycle Engineering is offered completely by distance education, and a number of other programs, especially in education and engineering, rely heavily on technology.

■ ***Dallas County Community College District (DCCCD)***

DCCCD is a national leader in distance learning. With seven member colleges, DCCCD distributes courses via the PBS station KERA, and local cable systems. In late 1997, DCCCD was named as an education pilot provider of Western Governor's University (WGU), where it had agreed to participate in its initial start-up and testing phase. Dallas Telecourses is DCCCD's telecommunications arm that produces telecourses for the PBS Adult Learning Service and Canadian networks. The group produces live, videotaped, and one-way video, two-way audio courses, as well as computer-based online courses. Dallas Telecourses transmit telecourses to more than 1,200 two and four year colleges and universities in the United States, and more than 40 other countries. Enrollment in Dallas Telecourses, more than 160,000 students every year, represents nearly 40 percent of the national total.

■ ***Southwest Center for Advanced Technological Education (SCATE)***

SCATE's efforts focus on improving advanced technological education in remote and rural areas in three key initiatives. First, SCATE strives to perform research and development of a distance education infrastructure. Second, the consortium targets developing and improving advanced technology curricula. Finally, via its faculty development efforts, SCATE prepares faculty to teach in interactive video classrooms, provides them with opportunities for graduate study, and develops special training courses.

■ ***Alliance for Higher Education***

The Alliance's TAGER Television Network offers sixteen engineering disciplines, plus MBA programming, health care programming, and a variety of business administration courses. The Alliance has updated its TAGER Television Network to respond to the needs of the information age. TAGER's new network of more than 30 broadcast channels plus high speed data options will be named the Cecil and Ida Green Education and Information Network, after TAGER's founder. The new network will continue to serve higher education institutions, support public education initiatives, create virtual libraries and museums, serve health care facilities, and deliver literacy and job training programs to community centers.

■ ***The Central Services Commission's Telecommunications Services Division***

The Telecommunications Services Division is currently focusing its efforts on serving rural areas of the state, which are not likely to obtain updated services because they are unprofitable. The Division is working with TEA's Commissioner's Access Initiative to prioritize the remote regions.

THE FUNDING SOURCES

■ ***K-12***

As part of the federal Technology Literacy Challenge Fund, the Texas Education Agency awarded $8.5 million in technology grants to 57 school districts and educational cooperatives, some of which will be used to support Internet connectivity. The grants will impact 452 independent school districts, four charter schools, and 59 private schools. The grants ranged in size from $43,000 to $4.5 million, and the state's rural school districts received funding priority. The grants address four key areas from the *Texas' Long-Range Plan for Technology, 1996-2010.* These four key areas include teaching and learning, educator preparation and development, administration and support service, and infrastructure for technology.

K-12 education in the state also benefits $150 million per year from the Telecommunications Infrastructure Fund (TIF), which was created by House Bill 2128 in September of 1995.

TECHNOLOGY

■ ***K-12***

K-12 education can select among a number of options for their distance education needs. The Texas Education Telecommunications Network (TETN) provides T-1 connections from the TEA to the state's 20 Regional Education Service Centers (RESCs) and serves as the basis for the development of a state education backbone. TETN's short-term goal is to enable email and Internet access to all schools. As the demand for service increases, the bandwidth will be increased.

The Texas School Telecommunications Resources (T-STAR) is a statewide television network created by the TEA to provide Texas K-12 public education students, teachers and administrators with direct access to satellite-delivered distance learning opportunities. More than 1,000 school districts, all 20 regional education service centers, and the TEA can use the T-STAR one-way video-two-way audio technology to tune in to their choice of credit courses, curriculum enhancement programming and electronic field trips, or professional development teleconferences from programming providers across the country. Funding for the equipment came from the technology allotment and subsequently from the Telecommunications Infrastructure Fund (TIF). TEA is transmitting T-STAR from analog to digital technology.

- ***Higher Education***

The Texas Higher Education Coordinating Board established STARLINK, the State of Texas Administrative Resource Link, in 1989. STARLINK is a satellite analog teleconference network connecting most of the community and technical colleges in the state. STARLINK provides live, interactive teleconferences for professional development, and produces and develops programming for state agencies and public entities. Austin Community College and Dallas County Community College District manage STARLINK on behalf of THECB.

- ***University of Texas (UT)***

The UT Telecampus will rely on the World Wide Web to offer courses, student services, and faculty development. In the past, courses offered in the 15-institution UT System via distance learning relied on an extensive network of dedicated T-1, ISDN services, and uplink and downlinking capabilities, with multiple classroom sites at almost every institution. Courses in the past have numbered between 180 and 200 per semester, most of which were graduate level. The UT System offers two full degrees and two partial degrees via distance learning.

- ***University of Houston***

The main campus delivers approximately 85 distance learning courses to 3,250 students per year via ITFS and compressed video. The distance learning system includes four school sites (two UH owned, one UH System owned, one collaborative) and three corporate sites (NASA, Texas Instruments and Compaq), which receive technical and engineering courses.

- ***Texas Tech University (TTU)***

HealthNet is composed of five sub-components. First, a two-way interactive video system links the four campuses of TTUHSC. The system provides educational and administrative communication via compressed digital video/audio/data technologies over leased, dedicated T-1 and DS-3 circuits. Eighteen interactive video classrooms and three interactive video conference rooms are included on the system. Second, the Rural Health Satellite Network (RHSN), a digital satellite television network, delivers continuing education to health care providers in 82 sites, most of which are in rural communities. RHSN provides approximately 16 hours of programming per day. Third, two-way interactive video system links rural primary care providers in 11 rural hospitals and clinics with specialists at tertiary centers via dedicated T-1 lines. Fourth, HealthNet includes a two-way VSAT interactive video system to provide telemedical services to prison facilities. Finally, a Ku band teleport facility can deliver programming to the STARLINK and T-Star networks.

TTU also operates KTXT-TV, a non-commercial educational television station. KTXT's facilities include a seven-channel cable system and a multi-terminal telecommunications receive-only earth station. The station provides approximately 105 hours of programming each week to audiences within a 60-mile radius of Lubbock.

- ***Texas A&M University***

Texas A&M's distance education efforts rely on interactive compressed video transmitted over a T-1 statewide leased video network. The network connects 90 sites, with one central switching node. Content and use of the network is determined by the institutions themselves. Satellite delivery is used only in cases in which little interactivity is required.

- ***Austin Community College***

The Distance Learning Advisory Committee is the planner of the Virtual College of Texas at the open campus of Austin Community College. There is a three-year implementation plan with a pilot program beginning this fall. The Virtual College of Texas will utilize the Internet, two-way interactive video, telecourse and satellite to offer course to all interested learners in Texas. Approximately 100 to 200 students are anticipated to participate in the first semester of the pilot programs, taking undergraduate courses.

- ***The General Services Commission's Telecommunications Services Division***

TEXAN is a statewide network with a DS-3 backbone composed of multiple T1 lines. Schools and universities have the option, but are not obligated, to make use of the statewide contract for network services. TEXAN serves more than 50 percent of the student population in the state as well as state agencies, higher education institutions, and regional education service centers. Currently, there's one MVS video bridge located in Austin, where University of Texas, Texas A&M University and the University of Houston are already connected. Plans for implementing SONET technology to meet future bandwidth needs are still being pursued.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

At every level of education, Texas' progress in educational telecommunications and technology has received well-deserved attention. The state's size, expanding population, and rural character make it an exciting and challenging place for distance education initiatives. Funding from the Telecommunications Infrastructure Fund (TIF) over the next ten years secures continued growth in the state's public school's plans for educational telecommunications and technology, which means that other states' K-12 projects will continue to look with envy at Texas' efforts. Although a few consortia involving institutions of higher education, especially among the state's community colleges, provide evidence for some degree of collaboration in that sector, the likelihood of long-term cooperation is still in question. Because the state's higher education institutions have launched their own, often well-conceived distance education projects and have articulated plans for expansion, the lack of collaboration can hardly be said to be impeding progress. The state's unique demographics and geography assure that Texas will continue to be a leader in distance education. As a leader Texas will be the first to receive applause, but it will also be the first to make mistakes and the first to encounter frustrating roadblocks.

UTAH

ACRONYMS AND NETWORKS

- HETI—Higher Education Technology Initiative
- UEN—Utah Education Network
- UENSS—Utah Education Network Satellite System
- USHE—Utah System of Higher Education
- USOE—Utah State Office of Education

EXECUTIVE SUMMARY OF THE STATE

The Utah Education Network (UEN), the state's coordinating body for educational telecommunications, has had much success in connecting education sites to its telecommunications infrastructure. More than 7,000 students in public schools and institutions of higher education have enrolled in EDNET's courses. Even as UEN looks forward to completing its infrastructure implementation, it is redirecting its activities to more closely focus on content. K-12 educational technology activity has centered on the state's Education Technology Initiative (ETI), a program now entering its ninth year of operation. As part of ETI, all school districts submitted a five-year plan for technology use in 1995 in order to qualify for funding.

Another K-12 initiative is the Utah Electronic School, an opportunity for students to fill the core and/or graduation requirements through online courses. The state is applying its Technology Literacy Challenge Fund award to develop approximately 100 online Electronic School courses. The Utah Board of Regents is pursuing its Higher Education Technology Initiative (HETI), a plan to promote the development of technology infrastructure and curriculum at the various state institutions. The Utah Electronic Community College, which received an appropriation for $118,600 in 1998, will pool the distance learning courses already offered at the six traditional community colleges to provide all the requirements of a two-year degree.

RELEVANT BACKGROUND AND BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Utah's exceptional progress in educational technology and telecommunications over the past five years can be attributed to three critical factors. First, Utah has enjoyed a supportive governor who has made telecommunications and technology-based instruction a concern to all educators. Second, the state's legislature has been willing to provide continued funding for a statewide educational telecommunications infrastructure. Finally, and perhaps most importantly, there is a long history of formal and informal cooperation among many education institutions and agencies in the state. The education community's vision of "central coordination and local control" has worked well and has contributed to interoperability among institutions.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Utah Education Network (UEN)***

The Utah Education Network is responsible for serving the state's teachers, faculty, learners, and parents by providing an educational delivery system and associated services, which utilize technology to complement the educational experience. UEN's 22-member steering committee includes representatives from the Utah State Office of Education (USOE), Utah System of Higher Education (USHE), state government, the governor's office, higher education institutions, K-12 school districts, and the private sector.

Distance learning in Utah is the shared responsibility of UEN, USOE, and the USHE. UEN consists of four educational resources. First, EDNET is a two-way, fully interactive video network for distributing higher education courses and high school classes. Second, UtahLINK is a statewide WAN data network that connects state government, higher education institutions, and K-12 schools. Third, KUED, Channel 7, the state's PBS affiliate, and KULC, Channel 9, an instructional television network, offer for-credit courses. Finally, the Utah Education Network Satellite System was established in 1997 to deliver one-way video, two-way audio courses to over 50 sites throughout the state. UEN is located at the Eccles Broadcast Center on the University of Utah campus.

■ ***Utah State Office of Education (USOE)***

The Utah State Office of Education (USOE) oversees the curriculum and programming of the distance learning courses that UENSS delivers. The USOE directs a great deal of its efforts at its *Education Technology Initiative*, its plan for educational technology, which stems back to 1990. As a result of USOE's guidance, schools and school districts throughout the state have developed five-year Plans for educational technology use. Those plans, which have been revised and are now in their second versions, served as the basis for the school districts' requests for Universal Service Funds and the state's *Educational Technology Initiative*.

■ ***Utah Board of Regents***

The Utah State Board of Regents was established in 1969 to serve as a governing body for the Utah System of Higher Education. The 16 members, who are appointed by the governor of Utah, oversee the establishment of policies, procedures, executive appointments, planning, budget and finance, and proposals for legislation, and provide administrative and program approval for higher education activities within the state.

The chief academic officers of the institutions of higher education provide academic guidance and coordinate development of courses for distribution by UEN. The Board of Regents is currently championing its *Higher Education Technology Initiative*, a plan to coordinate the installation of technological infrastructure, encourage development of innovative instructional programs, and implement advanced management information systems for the higher education institutions throughout the state.

During the 1996-97 academic year, the Utah System of Higher Education (USHE) reported that 447 courses were offered via EDNET, satellite, and KULC Channel 9. A total of 19,541 students enrolled in these courses.

■ ***Information Technology Commission***

The 21-member Information Technology Commission assumes responsibility for reviewing the state's technology expenditures, objectives, funding, and guiding the development of the state's telecommunications and infrastructure. The co-chairs of the Commission are a state senator and member of the House of Representatives.

THE DRIVING FORCE

The drive to complete the statewide telecommunications infrastructure has occupied every sector of education in Utah. The state's response to a key question—how will it actually use the network--will influence the course of educational technology and telecommunications over the next few years. The close working relationships among K-12 schools, higher education institutions, state agencies, and UEN that have accompanied the process of building the network will most likely sustain further efforts.

THE PLANS

■ ***Utah Education Network (UEN)***

UEN has directed its efforts over the past several years at connecting education sites throughout the state to its various networks. The results have indicated considerable success--more than 700 public schools have network connectivity, 200 EDNET sites have been installed, and all network users have very high speed Internet access. Many students have benefited from UEN's services--more than 2000 public education students, 3500 concurrent enrollment students, and 3200 higher education students participated in distance learning opportunities offered through EDNETin 1996-97.

In a 1998 white paper, UEN acknowledged that since its goals of connectivity and network reliability have been accomplished, UEN must redirect its activities to more closely focus on content. In order to better coordinate content, UEN is in the process of restructuring its organization and consolidating staff positions to create positions that would be responsible for planning content resources within each of UEN's separate operational entities (EDNET, UtahLINK, and KULC).

UEN's efforts align with the vision and goals identified in its document, *The Electronic Highway for Education*, the network's *Strategic Plan for 1997-1998*. In its plan, UEN reaffirmed its role as a partner in the state's educational technology initiatives and identified a series of benchmarks for its overall administration and for each of its instructional delivery systems. Among its benchmarks, UEN will strive to continue to make quality, technology-rich, learning resources accessible to all students, teachers, and faculty as an integral part of the curriculum in public schools and public higher education institutions. UEN also states that it will work so that every student, teacher, and faculty member in the public schools and public higher education institutions will have the necessary technology available in their learning environment to gain access to the Information Superhighway. UEN will also make efforts to provide teachers and faculty with the training and technological support that will permit them to use technology successfully.

■ *K-12*

Two entities guide K-12 educational technology initiatives in Utah: UEN, which is responsible for building the statewide telecommunications network, and the *Educational Technology Initiative*, which provides school and classroom computers and related technologies. The *Educational Technology Initiative (ETI)* began in 1990, with the passage of House Bill 468 and a $15 million initial appropriation. The ETI was meant to be a multi-year partnership involving state government, public school districts, colleges of education and private businesses. ETI's mission has two parts: to enhance the teaching/learning process, and to empower students to become literate, self-directed learners, problem-solvers, and productive members of a technology-oriented society. In a key part of the initiative, school districts were required to prepare four-year technology plans based upon identified needs and legislatively mandated criteria. Upon final approval by the ETI Steering Committee, legislative funds were released to school districts. School districts were required to submit a new five-year plan for technology use in 1995. When ETI was first established, a steering committee provided oversight. In 1995, ETI was placed within the Utah State Department of Education, where it coordinates its activities with the Utah Education Network Steering Committee.

The state is also developing the Utah Electronic School, online courses which students will use to fill the core and/or graduation requirements established by the Utah State Board of Education. The state will use its Technology Literacy Challenge Fund award to develop approximately 100 online courses. At first, 10 courses per year will be developed for the next two years, followed by 20 courses per year for the next four years. By the year 2003, the 100 projected courses will be completed. As part of this initiative, the Utah Education Network will provide support for the catalog and the necessary network facilities required for students to access all of the capabilities and learning opportunities available from Utah's Electronic School.

■ *E-rate*

Utah is one of the few states in which schools and school districts did not directly apply for Universal Service Funds. Schools and libraries submitted their applications to UEN, which then submitted a single application to the federal government. UEN worked closely with the districts, which were required to have a five-year technology plan.

■ *Higher Education*

In December of 1997, the governor announced the proposed creation of the Utah Electronic Community College (UECC) as part of his higher education budget recommendations for 1998. The purpose of the UECC is to provide a means for anyone, anywhere, anytime, to have access to an affordable, transferable two-year degree. The UECC will pool the distance learning courses already offered at the six traditional community colleges The initial budget appropriation of $118,600 will support the creation of classes not now available, so that online students could fulfill all the requirements of a two-year degree.

The Higher Education Technology Initiative (HETI) is the Utah Board of Regents plan to coordinate and encourage the development of networks and curriculum at the various state institutions. The initiative focuses on five key areas: state infrastructure, institutional infrastructure, curriculum development, the establishment of an electronic library, and the establishment of a data warehouse. Established in 1993, the program has received over $27 million in state funds and $3 million in recurring funds. The initiative has successfully developed a statewide network and is currently in the process of adding additional bandwidth. Curriculum development activities have been encouraged through a request for proposal (RFP) process. The RFPs encourage collaboration between institutions through the application of new technologies. During the last year, the development of a system-wide data warehouse was begun with the goals of providing timely information on the operation of the USHE and to guide future development efforts.

THE FUNDING SOURCES

■ *K-12*

Under the *Education Technology Initiative*, 25 percent of the funds are divided equally among school districts, creating a base amount. The other 75 percent is distributed according to the estimated average daily membership for the current year. This funding formula is an attempt to assure equity across large and small school districts. School districts and colleges of education are required to match state appropriations on a one-to-three basis, that is one dollar in local resources for every three state dollars, either through local funding efforts or through in-kind services. Beginning in 1993, the legislature established a line-item to be used by school districts to help offset the costs of repair, replacement, and upgrade of their ETI-purchased hardware and software. The initial allocation was $1 million.

For the 1998-99 school year, the legislature has allocated $82 million to ETI from supplemental funds and $25 million in line-item monies for a total legislative allocation of over $107 million. School districts have matched that amount with a total of $101 million. Since ETI began in 1990, the legislative and district expenditures on technology add up to more than $209 million.

In addition, K-12 schools received $500,000 to support the Computers for Public Schools Pilot Program, a program jointly sponsored by the Utah State Office of Education and the Department of Corrections. This award provides for the acquisition and refurbishing of donated computers to be used in public schools. The Department of Corrections Industries will establish a computer refurbishing facility at a designated correctional facility and will develop a program to provide inmates with skills to refurbish computers for the state's public schools.

In 1996, the US WEST Foundation provided $300,000 for the USWEST UtahLink Teacher Network Project. The money was used for laptop computers and training 300 teachers on Internet connectivity and incorporating the web into their curriculum. Each of the 300 teachers trained was responsible for training 10 other teachers.

■ ***Higher Education***

The Higher Education Technology Initiative (HETI) received $2.6 million in base budget funding. Additionally, $615,000 was appropriated to the Utah Education Network to cover expenses stemming from Higher Education's participation in and use of network resources.

The H.B. 184–Educational Technology Amendment, which became effective July 1, 1998, reinstates language which provides funding to the State Board of Regents which is to be "appropriated to the state colleges of education as a line item in the general appropriations act" and instructs the Regents to "distribute it based on each state college's student teacher training enrollment FTE's as compared to the total student teacher training enrollment FTE's for all state colleges of education." Beginning with the 1999 legislative session, there will be an appropriation to support the state's colleges of education in training students who are preparing to become teachers in the use of technology. Funding itself will not begin until fiscal year 2000.

TECHNOLOGY

■ ***UtahLink***

UtahLINK is the state's data service and Internet connection for K-12 schools and government agencies. Through the network, teachers have access to a variety of resources. Servers are housed at the state universities where video clips and pictures are stored which teachers are able to download and incorporate into the science, geography, and social studies classes. UtahLINK is also a database used for filing lesson plans that allow teachers the opportunity for online collaboration.

■ ***KULC, Utah's Learning Channel***

KULC-9 and KUED-7 are the state's Instructional Television networks. Under the guidance of UEN and the USOE, the stations broadcast over 80 ITV series each academic year, or approximately 700 individual programs. The 1,500 hours of public education programming include arts, foreign language, science, and social studies for K-12 classes. Programs are delivered via microwave and fiber to schools throughout the state.

■ ***Utah Education Network Satellite System (UENSS)***

The new satellite service, UENSS, began operation in the 1997-98 academic year. The system offers eight degree choices—three master's and five bachelor's degrees. The master's degrees are in Human Resource Management, Information Systems and Education, and Human Environment. The bachelor's degrees include Accounting, Business Administration, Psychology, Sociology, and Social Work.

■ ***EDNET***

Distance learning programming on UEN's EDNET targets high school, vocational, and higher education students, as well as administrative and faculty training. The high school and vocational school classes are presented in the morning and early afternoon. Administrative and faculty training is programmed for late afternoon, and higher education classes are in the evening. EDNET provides over 100 courses and seven degree programs. Five master's level programs include Nursing, Social Work, Instructional Technology, Special Education, and Psychology. Two bachelor's degrees are offered in Nursing and Business Administration. The greatest use of the network is concurrent enrollment, in which students take a college level course that will satisfy both high school and college degree requirements. There are 160 sites connected to EDNET, including schools, higher education sites, the state capital, and a corrections facility.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Utah is a prime example of a state which has successfully managed to plan, coordinate, and implement a statewide telecommunications infrastructure. Exceptional cooperation among state agencies has resulted in a single voice, data, and video network, EDNET, for use by all education entities, which limits redundancy and duplicate network services. Yet the successful deployment of the statewide system does not necessarily mean that there are no bumps in the road for Utah's educational telecommunications efforts. For the past several years, the state legislature has devoted considerable allocations to support the building of the statewide infrastructure. Now that the infrastructure is nearly completed, additional funds are becoming more difficult to obtain. Just as educators are beginning to turn their thoughts to issues of training and content, they encounter a lack of legislative support. This situation is common to a number of states, where an emphasis on hardware eclipses other considerations. Other states which are somewhat behind Utah in the implementation of their statewide networks have training and content components built into their plans, and may be able to sidestep the dilemma Utah now faces.

VERMONT

ACRONYMS AND NETWORKS

- GOVnet
- K12net
- SDE—State Department of Education
- UVM—University of Vermont
- VISMT—Vermont Institute for Science, Math, and Technology
- VIT—Vermont Interactive Television

EXECUTIVE SUMMARY OF THE STATE

Educational technology planning has occupied the State Department of Education (SDE) since 1996, when the Vermont State Technology Council formed a Goals 2000 Technology Advisory Committee. The committee worked to assess information technology initiatives, identify critical needs, and determine a future course of action. The committee's final report, *Vermont's Statewide Education Information Technology Plan*, describes the strategic direction for information technology within public education. With the 1995 expansion of GOVnet to include K12net, the state's schools have had greater access to information resources. The University of Vermont, too, has recently worked to expand its technology initiatives through its Division of Continuing Education (DCE). Over the past two years, UVM has built on the existing technological infrastructure at DCE's Instructional Television Studio and has added teleclassrooms to its system.

RELEVANT BACKGROUND AND BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Vermont's statewide network, GOVnet, and its public education component, K12net, evolved into their current forms over a period of several years. The 1992 *Vermont Information Strategy Plan (VISP)* supported the notion of a state government information system. In June of 1993, the Information Systems Advisory Council (ISAC) recommended using the fiber optic cable system initially installed in Montpelier and Waterbury to support the Human Resources Management System (HRMS) project, to serve as the backbone for an inter-agency network. Then in October of the same year, the ISAC moved to extend the fiber network to a statewide area network connecting district offices. In mid-1995, the state legislature passed a capital bill approving $978,000 for equipment purchases to fund the expansion of GOVnet for use by the K-12 community and the public libraries statewide.

GOVnet's expansion commenced in July of 1995, and by September of 1996, approximately 250 out of 300 K-12 schools and 150 public libraries had access to the network.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

- ***Information Resource Management Advisory Council (IRMAC)***

IRMAC, formerly known as the Information Systems Advisory Council, provides the policy, managerial, and financial oversight of the state's GOVnet, a statewide network infrastructure serving government offices and schools. IRMAC was created as a result of the Vermont Information Strategy Plan to develop an integrated network of services among government agencies. IRMAC is overseen by the state's Chief Information Officer (CIO), who reports to the Secretary of Administration.

■ ***K-12***

The State Department of Education coordinates statewide technology planning to align with the state's broader educational reform efforts. The SDE works with the Vermont Institute for Science, Math, and Technology (VISMT), the 1992 recipient of a five-year Statewide Systemic Initiative. VISMT strives to strengthen science, mathematics, and technology education for K-12 students, and uses a telecomputing network to allow the state's teachers, students, researchers, and private industry members to communicate and collaborate.

■ ***University of Vermont (UVM)***

UVM's Division of Continuing Education (DCE) has the responsibility of planning the university's computer and video-based supported Distance Learning Network. In addition to its own plans for expansion into distance learning, UVM is an active user of Vermont Interactive Television (VIT).

■ ***Vermont Interactive Television (VIT)***

VIT was established in 1988 to increase citizens' access to education and training and offer organizations a way to conduct business more efficiently and economically. A seven-member Coordinating Council appointed by the governor establishes VIT's policies and reviews its activities. VIT is housed on the campus of Vermont Technical College.

THE DRIVING FORCE

Vermont's slow but steady progress in technology and telecommunications planning has occurred through institutions' and organizations' individual efforts, most notably through those of University of Vermont and Vermont Interactive Television. Although a number of state agencies have acknowledged the need for coordinated planning, no central agency or individual has taken the lead and such activity remains unbroached.

THE PLANS

■ ***K-12***

In 1996, the Vermont State Technology Council formed a Goals 2000 Technology Advisory Committee to conduct an assessment of current information technology initiatives, identifying critical needs, and determining a future course of action in building information technology systems to serve students and educators. The committee's final report, the *Vermont Statewide Education Information Technology Plan*, provides the strategic direction for the proposed comprehensive education information technology system. The state's Information Technology Plan was designed to align with the *Vital Results* stated in *Vermont's Common*

Core Framework: Standards and Learning Opportunities. That is, by creating an information technology-rich environment, a community of lifelong learners will be equipped with the skills to succeed in an information age characterized by constant change.

The Vermont Goals 2000 Technology Advisory Committee organized its plan around critical issues in today's public education setting: equity of access, human resources and professional development, integration of information technology into the curriculum, equipment and facilities funding, administrative information technology, and local information technology planning. An information technology framework described in the *Vermont Statewide Education Information Technology Plan* details the rationale, design principles, and implementation strategies for the future Vermont information technology system. To extend the plan's vision, the committee prepared four separate, supplementary guide books to provide further information concerning implementation strategies for professional development, curriculum improvement, technological recommendations and standards, and local information technology planning.

The State Department of Education (SDE) established the Vermont Institute for Science, Math, and Technology (VISMT) in 1992 through a five-year grant of $9.6 million in 1992 from the National Science Foundation's Statewide Systemic Initiatives program. Since that time, VISMT has worked with the SDE to transform science, mathematics, and technology education for all students in Vermont. VISMT focuses its efforts on five clusters of activities: building the state infrastructure in science, math, and technology (SMT); delivering information on SMT to schools and the public; changing policy and practice through collaboration; working with schools to improve SMT; and building a leadership cadre in Vermont. Schools, school districts, and libraries in the state have access to K12net, an extension of GOVnet. K12net originated from funding from the 1995 legislature to expand GOVnet. By the fall of 1995, schools began to apply for network connections.

■ *E-rate*

Schools and school districts submitted their own applications for E-rate funds. The Department of Education provided a Listserv to act as a general clearinghouse for E-rate information, documents, links, and discussions. In addition, the SDE organized and conducted seven sessions to train school representatives on the application process.

■ *University of Vermont (UVM)*

In 1997, the University of Vermont (UVM) charged its Division of Continuing Education (DCE) to develop a University-wide, computer and video-based supported Distance Learning Network. Via several telecommunications technologies, UVM intends to deliver high quality, cost effective selected academic programs, certificate series, courses, seminars, and non-credit training to off-campus entities. By creating a network that relies on integrated transmission technologies and a system of interconnected teleclassrooms, UVM hopes to make the university a truly statewide resource. UVM will build the distance learning system on its existing technological infrastructure at DCE's Instructional Television Studio, which was upgraded to serve as a dual purpose studio and electronic classroom. In fiscal year 1996, DCE purchased a microwave link and license to connect UVM to a rented satellite uplink for two years. Also in 1996, UVM completed the construction of a second teleclassroom. In 1998, four additional teleclassrooms were completed. UVM anticipates offering 450 hours of programming per semester, which may necessitate the installation of an additional satellite uplink and downlink. Currently, UVM's Distance Learning Network offers distance learning credit courses through Vermont Interactive Television (VIT). The courses include those broadcast live on VIT as well as courses broadcast directly to UVM Regional Centers and some Vermont businesses. The UVM Distance Learning Network produces and broadcasts live interactive teleconferences to national audiences, courses and specialized educational programs on videotape for various professional audiences, and Advanced Placement courses for high school students.

In 1996, UVM's Center for Rural Studies (CRS) and Community Resource and Economic Development (CRED) received a grant from the US Department of Agriculture to fund UVM's Rural Community Connectivity Project. As part of the project, CRED and CRS used their existing statewide town officer training program as a framework for a short certification program leading to network access and Internet data utilization. With the cooperation of Vermont Interactive Television, CRED and CRS offered two, three-hour distance learning sessions during 1997 to town officers on issues related to computing and data access skills.

THE FUNDING SOURCES

■ K-12

As part of the Network Development Initiative, the State Department of Education awarded $500,000 to schools in April 1998. To qualify for the funds, schools had to have a network plan, a description of how the school would use the technology to increase learning opportunities, and evidence of local technical support for implementation and ongoing maintenance.

The state has provided other funds for technology initiatives in the schools. A total of $212,000 in state funds provided satellite downlinks to 31 high schools, which has allowed 90 students to take AP courses (70 English, 20 calculus) through the University of Vermont. Additional funds will support the purchase of 14 more high school downlink sites. State funds in the sum of $257,000 provided 118 schools with network access equipment in 1997. In addition, the state supports low cost Internet access to Vermont schools through K12Net.

The state's 1997 Technology Literacy Challenge Grant Program allocations took place in two phases. In Phase 1, April 1997, $450,000 was released to support local technology development grants, while $100,000 funded professional development consortia. In October of 1997, Phase II, an additional $400,000 targeted local technology development grants. By creating a two-phase system, the State Department of Education hoped to provide poor and needy schools and school districts with time to develop their applications for a Technology Literacy Challenge grant.

Vermont's schools have also benefited from other resources. VISMT received $99,000 in NSF funds to establish a statewide Internet plan. Through the IBM Reinventing Partnership project, a $2 million grant supports software development, professional development, and hardware.

- ***Vermont Institute for Math, Science, and Technology (VISMT)***

VISMT is in the sixth year of funding and is looking forward to an additional four years of NSF funding. VISMT is one of very few SSI's to have funding renewed beyond the initial five year grant.

- ***Vermont Interactive Television***

VIT is supported by a state allocation directly from the legislature, which accounts for 75 percent of its budget, and by user fees for the other 25 percent. Along with the University of Vermont, Vermont state colleges, and Fletcher Allen Hospital, VIT shared in a $90,000 TIIAP planning grant.

- ***Higher Education***
- ***University of Vermont (UVM)***

The Center for Rural studies at UVM received $100,000 in grant from the United States Department of Agriculture in January 1997. The grant money has been used to develop distance learning courses and for staffing.

TECHNOLOGY

- ***Vermont Interactive Television (VIT)***

VIT includes 12 sites on its statewide T-1 network. In addition to connecting for distance learning within the state, VIT also provides out-of-state connections via ISDN for schools, colleges, and businesses. Among VIT's services, the out-of-state connections have increased most rapidly over the past two years. Of VIT's users, 30 percent are from the education sector, 60 percent from state agencies and non-profit organizations, and 10 percent from the business sector. VIT recently switched from using Bell Atlantic as its telecommunications vendor to using Hyperion, a cable consortium, which offers the same T-1 service at lower costs.

- ***GOVnet***

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GOVnet's physical backbone consists of 15 T-1 lines and more than 50 56 Kbps lines providing connections between state buildings on the Montpelier and Waterbury campuses, as well as district offices statewide. Dial-in sites located in every local calling area of the state provide network access from any school or library in the state. Included in the network's services are Internet access, government-wide e-mail, and World Wide Web access to government information and services. More than three-quarters of K-12 schools in Vermont are connected to GOVnet's K12net. K12net also provides network access to more than 125 libraries in the state.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Almost three-quarters of Vermont's 246 communities have fewer than 2,500 residents, which make the state one of the most rural in the nation. The small, geographically separated communities have turned to technology more and more frequently in recent years to help overcome isolation. Although the situation has improved over the past two years, Vermont offers relatively few statewide technology resources for educators. In its 1996 *Vermont Statewide Education Information Technology Plan* for K-12 schools, the Goals 2000 Technology Advisory Committee stated that their technology recommendations hinged on whether the state, especially the State Department of Education, could provide leadership and guidance. Several months after the report's publication, the committee observed that such leadership had not emerged, either within the SDE or another agency. Yet Vermont has made admirable distance learning progress in the areas of higher education and continuing education through the combined activities of the University of Vermont and Vermont Interactive Television. With this expertise in distance learning in the state, K-12 schools may still be able to benefit from technology-based resources.

VIRGINIA

ACRONYMS AND NETWORKS

- CIM—Council on Information Management
- DIT—Department of Information Technology
- DOE—Department of Education
- VCCS—Virginia Community College System

EXECUTIVE SUMMARY OF THE STATE

Virginia's educational telecommunications and technology initiatives remain steadfastly decentralized. Public school divisions assume responsibility for creating technology and infrastructure plans that adhere to the specifications described in the commonwealth's *Six-Year Educational Technology Plan*. Although Virginia's community colleges cooperate in planning and delivering distance learning programming, the commonwealth's universities independently make decisions, with the notable exception of Old Dominion University's TELETECHNET initiative. Old Dominion University's TELETECHNET has expanded its delivery of distance education courses over the past two years by successfully developing partnerships with institutions in other states and the military.

RELEVANT BACKGROUND AND BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Until recently, educational telecommunications and technology activity at the K-12 level in Virginia was fairly predictable and consisted mainly of high school level courses offered via the commonwealth's satellite network, VSEN, which has been in operation since 1983. In 1996, Virginia's Board of Education released a *Six-Year Educational Technology Plan*, which resulted in a more diverse approach to instructional technologies. Even with the Plan, however, K-12 planning efforts still take place at the level of the school division, with the Department of Education acting more as an information disseminator than as a technology provider.

Although various public universities and the community college system offer their own projects, distance learning in Virginia's institutions of higher education is most often associated with Old Dominion University's TELETECHNET. Old Dominion University has been involved in distance education since 1992, when its TELETECHNET network emerged from the university's earlier efforts in instructional television. TELETECHNET delivers a "two plus two" curriculum to the commonwealth's 23 community colleges. Under this agreement, a student's first two years of study at a community college counts as their freshman and sophomore years of study toward a baccalaureate degree, and the final two years of course work are provided by Old Dominion University. TELETECHNET is the vehicle that provides the second two years of instruction to the community college sites. TELETECHNET began operation in 1994, and by the fall of 1997 all 23 community colleges in the commonwealth participated on the network.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***K-12***

The Department of Education (DOE) cooperates with the commonwealth's Board of Education in carrying out the recommendations articulated in the Board's 1996 *Six-Year Technology Plan*. The DOE also works closely with the Council on Information Management (CIM) to coordinate schools' and school divisions' infrastructure plans. The DOE oversees the various distance education initiatives involving public schools, including the Virginia Satellite Education Network (VSEN) and the online network VA PEN. A key consideration in the DOE's distance learning planning is the need to coordinate technology plans with the commonwealth's new Standards of Learning, which include benchmarks for technology knowledge and use for all fifth and eighth grade students.

■ ***State Council of Higher Education of Virginia (SCHEV)***

SCHEV is the coordinating board for the commonwealth's 15 four-year institutions and the 23 community colleges. The overall decentralized nature of the university system has resulted in a lack of coordinated planning and regulation of distance education. In June 1998, SCHEV sponsored a conference to address the state's distance education policy and coordination. Virginia institutions are participants in the Southern Regional Electronic Campus and are collaborating with campuses that include both public and private four year and two year institutions.

■ ***Virginia Community College System (VCCS)***

VCCS includes 23 community colleges. The VCCS organized a Distance Learning Study Group in 1995 to consider options for managing distance education in the community colleges. The result of the group's work was a February 1996 proposal for a distance education management plan, which was subsequently implemented and revised.

■ ***Council on Information Management (CIM)***

The Council on Information Management (CIM) promotes the coordinated planning, practical acquisition, effective development, and efficient use of information technology resources serving needs of agencies and institutions of higher education in the Commonwealth. The nine-member council is charged with developing a comprehensive, statewide four-year planning process, which is to be updated annually and submitted to the Governor.

■ ***Department of Information Technology (DIT)***

The Department of Information Technology is the state agency designated to purchase and acquire telecommunications services and supplies for state agencies. Through the aggregation of users and demands, DIT is able to negotiate favorable arrangements statewide.

In addition, the governor established the position of Secretary of Technology, who serves as the Chief Information Officer of the Commonwealth. The secretary's role is to encourage both the use of efficient technology by the state government and appropriate initiatives to ensure a technology friendly business climate.

THE DRIVING FORCE

K-12

The commonwealth's new Standards of Learning, a set of course-related knowledge organized by grade level that all students are expected to master, includes a technology component. Under the new standard, which was assessed for the first time in the spring of 1998, all students at the end of their fifth and eighth grades are required to demonstrate an understanding of computer technology. The new computer standard influences where the Department of Education places its emphasis as it attempts to meet the recommendations put forward in the Six-Year Educational Technology Plan.

Higher Education

In the past, each institution independently planned its own educational telecommunications projects, and therefore the resulting character of the existing distance learning initiatives mirrored the needs of the particular universities or colleges. TELETECHNET and the Virginia Community College System's compressed video network, however, have required institutions to collaborate more closely in developing courses and degree programs.

THE PLANS

K-12

The Department of Education is in the midst of implementing the recommendations stemming from the *Six-Year Educational Technology Plan (1996-2002)*. The *Six-Year Educational Technology Plan* is an extension of statewide activities occurring from 1994 to 1996 that provided automation, multimedia, and telecommunications capabilities to all K-12 library media centers. The Governor's and General Assembly's Technology Initiative for 1996-98 outlined activities during the first two years of the *Six-Year Educational Technology Plan*. The focus during the plan's first year was on retrofitting school buildings and supporting technology upgrades, networked computers in classrooms, and local and wide area networking. The second year of the *Six-Year Educational Technology Plan* funded central office networking and computers, graphing calculators, and scientific probeware to support the commonwealth's new Standards of Learning. Other key outcomes of the *Six-Year Educational Technology Plan* include a requirement that all school divisions submit updated technology plans and a funding allotment to support training.

E-rate

The Department of Education provides information updates as E-rate funds are made available. Although the DOE may apply for state level funds to support transponder costs and uplink charges, it expects that each school division will make its own application for the funds.

■ ***Old Dominion University (ODU)***

In 1997-98, TELETECHNET offered courses leading to nine bachelor's degrees, six master's degrees, and one certificate program, which involved more than 14,000 course registrations. Old Dominion University continues to explore new opportunities for distance education that take TELETECHNET outside the commonwealth's borders. In late 1997, the university became affiliated with the Southern Regional Electronic Campus, created by the Southern Regional Education Board to offer courses to students throughout the Board's 15-state region. In a pilot program during the spring of 1998, TELETECHNET offered business and administration courses to sailors aboard the USS George Washington, which was stationed in the Persian Gulf at the time.

■ ***Virginia Tech***

Virginia Tech's activities center on computing technologies and national and regional infrastructures. The university participates in a number of computing initiatives, including Internet2, the Southern Crossroads consortium, and the East Coast GigaPoP Consortium. With regard to distance learning projects, Virginia Tech initiated a program to provide training in technology and applications to K-12 teachers.

Virginia Tech's Distance Learning Project extends live, interactive instruction from the campus and other areas to cooperating industries and institutions. Courses are broadcast using specially designed electronic classroom studios. Services provided include design, development, coordination, and production of television programming for dissemination through tape, videodisk, multimedia, and direct satellite broadcast.

■ ***Virginia Commonwealth University's Medical College of Virginia (MCV)***

The Medical College of Virginia (MCV) has overseen two telemedicine projects since 1995. The first, which has been active since August 1995, consists of a connection between the medical school and the Blackstone Family Practice Center, a rural clinic. The T-1 connection enables physicians to provide consults in cardiology, dermatology, and orthopedics, as well as medical education. MCV's other telemedicine involvement is a project that includes the participation of the commonwealth's Department of Corrections. Via a T-1 connection between the medical school and the Powhatan Correctional Facility, physicians have provided consults in infectious diseases, cardiology, and oral surgery screenings since October 1995.

■ ***University of Virginia (UVA)***

The University of Virginia's Health Sciences Center heads the Southwest Virginia Alliance for Telemedicine. The telemedicine network links four rural medical sites (Thompson Family Health Center, Lee County Community Hospital, Stone Mountain Health Clinic, and

Norton Community Hospital) to the University of Virginia Health System. Health related educational programming and clinical services are provided to the rural sites.

■ ***Virginia Community College System (VCCS)***

The Virginia Community College System's most recent efforts in distance education have centered on its Instructional Technology Initiative, a pilot compressed video network (CVN). The network connects five VCCS Centers for Distance Education located in different parts of the commonwealth: J. Sargeant Reynolds Community College in Richmond, New River Community College in Dublin, Northern Virginia Community College in Annandale, Southwest Virginia Community College in Richlands, and Tidewater Community College in Portsmouth. In the spring of 1996, the project's pilot semester, the Centers for Distance Education offered 11 courses, a total which reflected at least two contributions from each of the five sites. Several of the courses were prerequisites for Old Dominion University's TELETECHNET programs. In the fall of 1997, VCCS offered a total of 427 courses, a number which reflects both CVN and non-CVN courses. More than 8,600 students throughout the community college system participated.

In addition to providing distance education courses, the Instructional Technology Initiative involved positioning instructional designers at each center to assist faculty in shaping courses to fit the compressed video medium and develop appropriate distance learning resources.

■ ***Council on Information Management (CIM)***

CIM recognizes that a key component of education in the future is distance learning. The critical component in implementing distance learning is the creation of digital databases and electronic libraries that contain voice, full-motion video, data, music simulations and instructional software.

THE FUNDING SOURCES

■ ***K-12***

Bond sales supporting technology funding for the *Six-Year Educational Technology Plan* were released in the spring of 1997 and 1998. The Virginia Public School Authority (VPSA), which obtained financing two years ago for elementary library media center automation and networking programs, financed the equipment program.

■ ***Old Dominion University (ODU)***

TELETECHNET received approximately $3 million to support its initial efforts in 1994. In 1995, the General Assembly provided an additional $800,000 that was used to connect more community college sites. The General Assembly allocated another $900,000 in funding to connect the remaining community colleges in 1996.

■ ***Virginia Commonwealth University's Medical College of Virginia (MCV)***
Funds provided from the Virginia Department of Corrections have helped support MCV's telemedicine project with the Powhatan Correctional Facility. In 1995-96, the Department of Corrections supplied $169,000, and followed in 1996-97 with an award of $115,000.

■ ***University of Virginia (UVA)***
In September 1997, UVA's Office of Telemedicine received a grant from the NTIA's Telecommunications and Information Infrastructure Assistance Program (TIIAP) in the amount of $412,269. The money will support a telemedicine network connecting four rural sites with the University of Virginia Health System.

■ ***Virginia Community College System (VCCS)***
VCCS received $1.3 million in funding for its Instructional Technology Initiative from the Virginia General Assembly during 1994-96. Bell Atlantic awarded the VCCS additional grants of $240,000 (in 1995), $220,000 (in 1996), and $230,000 (in 1997) as part of the telephone company's Distance Learning Grants Program.

TECHNOLOGY

■ ***K-12***
The Virginia Educational Satellite Network (VSEN) reaches 65 to 70 school divisions through satellite downlinks, providing access to 14 courses for 1,600 students throughout the commonwealth. During the 1997-98 school year, VSEN continued its plans to convert all downlinks to a digital format, which ultimately will decrease the per program cost of transponder time via multi-cast compressed video.

■ ***Old Dominion University (ODU)***
When TELETECHNET began, it relied on an analog Ku-band satellite system to provide one way video, two way audio to twelve community college sites. In 1995, the system shifted to a proprietary, Ku-band digital network. Voice and data are transmitted over a one-quarter to a full T-1 line.

Old Dominion University's TELETECHNET program is an interactive distance learning program. It enables students who live in remote locations to earn bachelor's and master's degrees from a fully accredited university. TELETECHNET students complete their first two years through their community college or other accredited institutions and ultimately receive their bachelor's or master's degree from Old Dominion University.

There are over 30 sites in Virginia to see and hear the professors as well as take interactive part in class. During the 1997-1998 school year, more than 14,000-course registrations were anticipated.

■ ***Virginia Community College System (VCCS)***

VCCS operates a compressed video network over low-speed (ISDN and switched 56) telecommunications lines. Each of the five Centers for Distance Education includes VTEL 227 MediaMax rollabout units.

■ ***Council on Information Management***

The physical network includes the backbone structure and operation, the local loop access, gateway operation, and networking. The telecommunications infrastructure is supported by miles of copper, coaxial and fiber cables; microwave broadcasting and receiving stations; telephone switching equipment; and a cellular phone system.

OTHER MISCELANEOUS BUT RELEVANT INFORMATION

■ ***NET.WORK.VIRGINIA***

Virginia Tech, in association with Old Dominion University and the Virginia Community College System, offers NET.WORK.VIRGINIA, a broadband network delivering ATM service to 120 sites across the commonwealth. The network can deliver simultaneous transmission of interactive voice, data, and video services, and its bandwidth can be flexibly allocated and reallocated as needed. NET.WORK.VIRGINIA is open to all institutions of higher education, public and private schools, private educational sites, agencies, and localities of the Commonwealth of Virginia.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

A long-time leader in telecommunications coordination, Virginia offers examples of growth in educational telecommunications at both the K-12 and higher education level that may be relevant to other states' planning efforts. Over the next several years, if the commonwealth's technology plans proceed on schedule, K-12 schools and school divisions will make tremendous investments in technology and training, without much leadership at the state level. When VSEN courses were the only option for K-12 distance learning, such decentralization did not carry much risk. With the current array of technology to select from, school divisions' decision making becomes more onerous. It will be interesting to see what changes, if any, occur in the DOE's traditionally hands-off approach to planning.

Even as Virginia's K-12 educational telecommunications initiatives have deepened, so have higher education's efforts broadened. Old Dominion University's TELETECHNET provides one instance of a distance learning provider that continues to seek new markets for its product. With Virginia's community college market exhausted, TELETECHNET has reached out to sites in Idaho and throughout the 15-state area covered by the Southern Regional Education Board. While creating very visible outcomes, this amount of expansion in such a short time may stretch too thin an institution's resources. Like many other institutions involved in distance learning and searching for more revenues, Old Dominion University will eventually face the question of how much growth is enough, and how much is too much.

WASHINGTON

ACRONYMS AND NETWORKS

- CTC—Community and Technical College System
- DIS—Department of Information Services
- TOPC—Telecommunications Oversight and Policy Committee
- WIN—Washington Interactive Network
- WIT—Washington Interactive Technology System

EXECUTIVE SUMMARY OF THE STATE

Since 1996, the state has been deeply involved with implementing its K-20 Telecommunications Network, a statewide fiber optics based network for all education entities. A 16-member Telecommunications Oversight and Planning Committee assumes responsibility for guiding the network, and the Department of Information Services oversees the allocation of $61.4 million of state funding. The three phase K-20 Network is in its second stage of development, and is in the process of connecting the state's 296 public school districts, public higher education off-campus and extension centers, branch campuses of community and technical colleges, and independent non-profit baccalaureate institutions to the network.

Within higher education, over the past two years Washington's Community and Technical Colleges (CTC) have been the most proactive in holding collaborative discussions focusing on distance education and educational technology. In 1996, the CTCs released a *Strategic Plan for Educational Technology, 1996-2001*, which resulted from an Educational Technology Initiative (ETI) funded by the 1995 Washington State Legislature. Then in 1997, the CTCs issued a distance learning vision statement, Overcoming Boundaries of Time and Place.

RELEVANT BACKGROUND AND BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Much of the educational technology and telecommunications activity in Washington involves the participation of the Department of Information Services (DIS), which was created by the state legislature in 1987. One of DIS' first charges was to develop a statewide video telecommunications system. DIS pursued case studies of numerous agencies to determine the potential need for video telecommunications and produced a strategic plan containing recommendations to implement a shared statewide system that would integrate multiple technologies and existing resources. In partnership with the Office of the Superintendent of Public Instruction (OSPI), the state's nine Educational Service Districts (ESDs), and higher education, DIS embarked on the Triad video demonstration project in 1991, supported by $1 million from the state legislature. By the fall of 1991, Triad was in operation and distance learning curricula were tested. Bellevue Community College provided the classroom space, DIS worked on technical hardware acquisition and operation, and OSPI provided curriculum development. Upon the completion of the Triad project, DIS presented a *Video Telecommunications Strategic Plan* to the state's Information Services Board. In October of 1993, DIS began operating its Washington Interactive Television System (WIT), which more recently changed its name to the Washington Interactive Technology System, as a cost-recoverable service for all state agencies.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Department of Information Services (DIS)***

The Department of Information Services oversees a number of technology planning activities. Some of DIS' involvement in information technology planning takes place through the Management and Oversight of Strategic Technologies Division's (MOST) Policy and Planning Group. MOST provides strategic information IT policy leadership for the state and provides staff support to the Information Services Board and the Customer Advisory Board. Policy advisors from Management and Oversight of Strategic Technologies Division serve the Information Services Board (ISB) by conducting reviews and providing assessments of agencies' Information Technology plans to assure compliance with established policies, statewide plans, and standards. Agencies are required to file plans with MOST for their IT Strategic, Security, and Disaster Recovery/Business Resumption plans on a scheduled basis. MOST also maintains and updates IT policies as directed by the ISB, and introduce new agency guidelines for emerging technologies to ensure effective, efficient use of IT resources. The Policy and Planning Group has been involved with a number of recent state level initiatives, including the Telecommunications Oversight and Policy Committee (TOPC) and the Governor's Telecommunications Policy Coordination Task Force.

DIS also oversees the Washington Interactive Technology System (WIT), formerly known as Washington Interactive Television System. WIT resulted from a legislative mandate requiring the Department of Information Services to ensure the development of a statewide video telecommunications system for state agencies, public schools, higher education and other government entities. WIT began providing one-stop shopping for the state's video telecommunications needs in October of 1993, after the completion of the Triad project, which served as a pilot.

■ ***K-20 Educational Telecommunications Network***

Senate Bill 6705 (Law E2SSB 6705) established the K-20 Educational Telecommunications Network in March of 1996. The K-20 Network is to be "an integrated and interoperable educational technology network serving kindergarten through higher education and promoting access for Washington citizens." The network is meant to be a collaborative effort of public and private K-12 and higher education, state government, the legislature, and the private sector in providing distance learning and other lifelong learning. Responsibility for administering the K-20 Network rests with the Information Services Board (ISB) and the Telecommunications Oversight and Policy Committee (TOPC), which is charged with adopting policy goals and objectives, adopting a network design and implementation plan, and authorizing release of funds for network purposes. The 16-member TOPC includes representatives from the state legislature, state education agencies, community and technical colleges, state libraries, school districts, public schools, and telecommunications industry.

THE DRIVING FORCE

A greater need for cost effectiveness and reduced redundancy in services encouraged the development of the K-20 Telecommunications Network in 1996. Within higher education, the increasing population of the state's 17 to 25 year olds has contributed to discussions of using technology as one solution to reach more students. More institutions are looking especially at World Wide Web based technologies to serve the 57,000 additional students expected to enroll during the period of 1997 to 2010.

THE PLANS

■ *Department of Information Services*

In April of 1998, the Department of Information Services announced that its Washington Information Network (WIN) would be phased out. WIN began in 1994 as a system of 48 interactive kiosks placed throughout the state, providing citizens with electronic access to government information. Given the increasing popularity of the Internet as a means of obtaining government information, the kiosks never became self supporting and state agencies became reluctant to invest time and resources placing material on them. DIS will introduce its new public access service, the Internet-based Access Washington, beginning in the summer of 1998.

■ *K-20 Telecommunications Network*

The K-20 Telecommunications Network offers Internet connections, Intranet services, satellite-delivered instruction and videoconferencing capabilities to all levels of education. The fiber-optic network builds upon the Washington Education Telecommunications System (WETS). The K-20 Network will be developed in three phases. Phase 1, which became operational in November, 1997, saw the development of a backbone connecting the nine regional Educational Service Districts, the main campuses of public baccalaureate institutions, the branch campuses of UW and WSU, and the main campuses of community and technical colleges. In Phase 2, a two-year phase extending from 1997 to 1999, network connections will be provided to the state's 296 public school districts, public higher education off-campus and extension centers, branch campuses of community and technical colleges, and independent non-profit baccalaureate institutions as prioritized by the TOPC, and other distance education facilities. During Phase 3, connections to other entities such as public libraries, state and local governments, community resources centers, and the private sector will be undertaken.

There are approximately 500 K-12 schools throughout five Northwest states (over 180 in Washington State) that downlinks programming from the Satellite Telecommunications

Educational Programming Network, STEP-STAR. STEP delivers K-12, alternative education and adult literacy programs via satellite and cable. In addition, STEP continues to use a one-way video, two-way audio system to reach high school students and teachers nationwide. Nearly 20 programs are offered annually as well as colleges courses to high school students. STEP has been active in providing education on-line and computer based learning while programs are not aired.

■ ***E-rate***

Schools and school districts are responsible for submitting their own requests for discounted telecommunications rates. The Office of the Superintendent of Public Instruction has disseminated information explaining the process, assisted schools with technology planning, and approved technology plans for over 270 of the 296 public school districts in the state, as well as for a number of private schools. The K-20 Telecommunications Network will only make e-rate applications for the main backbone support on behalf of school districts.

■ ***Higher Education***

■ ***Community and Technical Colleges (CTC)***

The state's 33 community and technical colleges have directed resources over the past two years to system wide planning for educational telecommunications and technology. In March 1997, the CTC's Learning Network of Washington (LearnNOW) released its distance learning vision statement, *Overcoming Boundaries of Time and Place.* The document highlights the fact that distance learning is a natural extension of community and technical colleges' mission of making education accessible to every learner, regardless of academic background and within economic means. The vision statement stated that cost and FTE distribution for shared courses and programs will be equitable among college partners, and that distance learning credits will be articulated among institutions. The community and technical colleges also expressed interest in assisting in the building of a statewide infrastructure to support distance learning technologies in the vision statement.

The 1997 vision statement follows the CTC's *1996 Strategic Plan for Educational Technology, 1996-2001*, a plan that resulted from a planning process stipulated by the Educational Technology Initiative (ETI) funded by the 1995 Washington State Legislature. The plan sought to establish an educational technology vision for the system, identify implementation models, and recommend strategies. The plan included a number of recommendations for the State Board of Community and technical Colleges, including endorsing a standard, minimum capability networked educational technology infrastructure, and developing incentives to promote collaboration and cooperation among the colleges, especially with regard to Internet and distance education initiatives.

■ ***The Center for Information Services (CIS)***

The Center for Information Services was formerly known as the Communications Technology Center provides computing and technology services to all Washington State's community and technical colleges and the State Board for Community and Technical Colleges. CIS' mission is to work with college staffs to establish information system and instructional technology requirements, service levels and required resources. In addition, CIS assists colleges in telecommunications network planning, acquisition, installation and support within and among campuses and with other external networks.

■ ***Washington Higher Education Telecommunication System (WHETS)***

The Washington Higher Education Telecommunication System (WHETS) is a digital microwave system operated by Washington State University in partnership with the University of Washington and Central Washington University. WHETS provides approximately 70 courses of distance education programming per semester and videoconferencing services to 14 sites in 10 cities. WHETS has been providing distance education services since the early 1980s. Its recent efforts include participation in the state's K-20 Telecommunications Network. The K-20 Telecommunications Network is expanding as a result WHETS will have more access to schools and campuses to deliver courses.

THE FUNDING SOURCES

■ ***K-20 Telecommunications Network***

A K-20 Technology Account was created in the state treasury by legislative action, where the Department of Information Services (DIS) deposits all monies received by appropriations, gifts, grants and endowments. The initial appropriation for the K-20 network was $42.3 million for the 1997-99 biennium, with an additional $19.1 million added in the 1998 session, which supports the construction of the backbone infrastructure and initial start-up costs. The on-going operations of the shared infrastructure are funded through the K-20 Revolving Fund, an internal service fund that covers recurring costs, such as transport, node maintenance and operations, node-site equipment depreciation and network administration, and replacement costs of the shared K-20 assets. The costs of the maintenance and operations of local networks or non-shared on-premises equipment is borne by individual institutions. Disbursements from the K-20 Technology Account and the Revolving Fund are authorized by the Department of Information Services with approval of the TOPC.

■ ***Higher Education***

■ ***Community and Technical Colleges***

The activity seen today in the state's community and technical colleges can be traced back to a 1995 capital budget appropriation for technology of $17.8 million to support an Educational Technology Initiative. The ETI funding supports four categories of activities. First, approximately 35 percent of the funds ($6.2 million) supported the development of a system wide network infrastructure for instruction and administrations. Second, more than one-half of the appropriation ($9.5 million) went to the individual institutions to support instructional technology projects. Third, a total of $1.9 million targeted video telecommunications projects. Finally, $250,000 was allocated for strategic planning activities.

TECHNOLOGY

■ Department of Information Services (DIS)

The Department of Information Services (DIS) operates the third largest data center in the Pacific Northwest. DIS manages several large statewide networks that provide customers with connectivity and access to a number of mainframe and mid-size computer systems. An asynchronous dial-up service (Dial-Access) is also provided supporting remote connectivity to state agency applications residing on the DIS System 390 and Unisys mainframe processing systems. The DIS System 390 platform includes two large IBM or compatible mainframe processors. The center provides interactive computing and other services to over 100 state agencies.

The Dial Access service utilizes a number of competitively acquired Value Added Network (VAN) services to support the delivery of this dial-up service to customers. The DIS' wide area network provides DIS customers with statewide, voice, data, and video transport. Network points of presence (POPS) are located in Olympia, Lacey, Seattle, Spokane, Yakima, and Vancouver.

■ Washington Higher Education Telecommunication System (WHETS)

WHETS relies on digital and analog microwave technology to transmit signals between its 14 sites. Each microwave signal provides several channels. Audio and video switching between more than two sites is supported by a multi-point control unit. Multi-site courses are supported on digital circuits to ensure that all sites participate on an equal basis, while point-to-point courses are supported on analog circuits. Digitizing the system brings its capacity to potentially 28 T-1 channels. An additional high speed data service utilizes excess capacity of the digital transmission system to provide voice and data services between campuses.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Washington has demonstrated remarkable change over a relatively short period of time. Until 1994, the state could be characterized as one in which telecommunications and technology efforts were distributed among a number of agencies and institutions, with few attempts at coordinated discussion. The state's initial explorations of educational telecommunications—the Triad demonstration project and WIN interactive kiosks are two of the better known—were met with success ranging from modest to none. Given this background, it is remarkable that the strongly centralized K-20 Telecommunications Network could emerge. As the K-20 network's second and third phases continue to be implemented over the next few years, it will be interesting to follow its actions, as well as those of the Telecommunications Oversight and Planning Committee.

WEST VIRGINIA

ACRONYMS AND NETWORKS

- Governor's—Office of Technology
- IS&C—Division of Information Services and Communications
- ITC—Information Technology Council
- Science and Technology Advisory Council
- West Virginia State College and University System
- WVDE—West Virginia Department of Education
- WVNET—West Virginia Network for Educational Telecomputing

EXECUTIVE SUMMARY OF THE STATE

A host of legislative acts and governor's actions have changed the face of educational telecommunications and technology planning over the past three years in West Virginia. As a result of the recommendations of a number of planning groups, the state is involved in developing and implementing a statewide ATM network. Public K-12 education has been busy implementing the recommendations concerning technology integration articulated in the *West Virginia Educational Technology Plan*. The West Virginia Department of Education's SUCCESS and BS/CE projects represent two comprehensive approaches to improving students' skills in using technology. Institutions of higher education continue to pursue their own technology-related projects and collaborate on initiatives such as the State College and University System's Technology Assisted Workforce Development Program and the Southern Regional Education Board's Electronic Campus. Furthermore, Bell-Atlantic WV has established the WV2000 Grant Program, which is deferring the equipment cost for higher education institutions to connect to the ATM backbone.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

House Bill 4529 (1996) created the West Virginia Science and Technology Advisory Council to prepare a strategic plan for the state's science and technology development. Also in 1996, Governor Caperton formed the Information Technology Council (ITC) to develop and assist the governor in the implementation and maintenance of a *Technology Master Plan*. Governor Underwood created a Chief Technology Officer position in 1997 to develop a unified and integrated structure for information systems for all executive agencies. The Officer has additional responsibilities for ❶ recommending transfers of equipment and human resources from any executive agency and the most effective and efficient uses of the fiscal resources of executive agencies; and ❷ to consolidate or centralize information processing operations. The Chief Technology Officer also has the responsibility of coordinating the activities of the various planning groups overseen by the Governor's Office of Technology. Higher education activities in the state have been influenced by legislation enacted in 1995. Senate Bill 547 (1995) directed the chancellor of the University of West Virginia board of trustees and the chancellor of the board of directors of the state college system to establish a plan and funding recommendations for development and implementation of a multifaceted instructional technology strategy. SB 547 required that the strategy include: a goal that every full-time freshman student beginning in the fall 1996 semester will own or lease a computer, and alternatively, that computers be available for part-time students through on-site labs; the integration of computer usage into all course work; the involvement of faculty in the development and use of technology-based instruction and instructional courseware for community and technical colleges, colleges and universities; and the expansion of distance learning and technology networks throughout the higher education systems.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ Governor's Office of Technology

The Governor's Office of Technology oversees several statewide, technology-related planning groups, whose actions are coordinated by a Chief Technology Officer. The Chief Technology Officer works closely with the Information Technology Council, the West Virginia Science and Technology Advisory Council, and the Department of Administration Division of Information Services and Communications in establishing short- and long-range information technology goals to be met by the state. Foremost among the goals is the implementation of a statewide information infrastructure initiative designed to establish West Virginia as a national leader in the use of broadband technologies, such as asynchronous transfer mode (ATM), particularly in addressing higher education and government efficiency issues.

■ West Virginia Science and Technology Advisory Council

The West Virginia Science and Technology Advisory Council is the body charged with the task of preparing the *West Virginia Science and Technology Strategic Plan*. The council includes appointments representing a wide range of science and technology interests and regions in West Virginia. Its stated purposes are to promote a scientifically literate citizenry, to encourage the creation of higher paying jobs, and to enhance the growth of West Virginia's gross state product. One of the council's first tasks was to develop an initial comprehensive strategic plan to support and foster economic growth in science and technology research and development, to be developed and provided to the Governor and the Legislature no later than July 1, 1997. As of July 1, 1997, the Science and Technology Advisory Council was reestablished under the office of the governor with essentially the same power and duties.

■ Information Technology Council

The Information Technology Council (ITC) was created in 1996 to develop, and assist the governor in the implementation and maintenance of, a *Technology Master Plan* for equipping the state and its various branches and agencies with compatible, networked, state-of-the art information systems and other telecommunications technology. The ITC provides advice and counsel for accomplishing the desired objectives of the state and its various branches and agencies in the use of technology. The council includes the chief of operations from a number of state agencies, including the Department of Education.

■ ***Department of Administration Division of Information Services and Communications (DOA–IS&C)***

The Division establishes, develops, and improves data processing functions within the various state agencies for promulgating standards in the utilization of data processing equipment, and for promoting the most effective and efficient operation of all branches of state government. In addition, IS&C, in collaboration with the Governor's Office of Technology, is charged with the responsibility for establishing policy and future direction for information system technologies within West Virginia state government.

■ ***State Colleges and University System (SCUS)***

SCUS' Instructional Technology Advisory Council helps guide the development of content for distance learning efforts in higher education. The council was charged originally with the implementation of some of the courses of action outlined in SB 547.

■ ***Educational Broadcasting Authority (EBA)***

The Educational Broadcasting Authority owns and operates the three public television stations in West Virginia, which became networked in 1995 via a licensed microwave backbone. Prior to that time, the stations were independently programmed and operated. Although EBA plays a small role in statewide planning for educational telecommunications and technology, the agency works closely with the WVSDE and the state's Distance Learning Coordinating Council.

■ ***Distance Learning Coordinating Council***

The Distance Learning Coordinating Council includes the major distance education delivery providers in the state: EBA, Ednet, SATNET, WVNET, as well as institutions at all levels of education. The council is the coordinating body for the delivery of programs over West Virginia's various educational networks. The council developed the original plan for a statewide migration to ATM. The plan has been adopted and implemented statewide. The Council's plan for the future is to make recommendations to deliver more courses over the Internet.

■ ***West Virginia Network for Educational Telecomputing (WVNET)***

The West Virginia network for educational telecomputing provides and facilitates state-of-the art information technology and networking in support of higher education in the West Virginia state college and university systems. WVNET provides an information highway within the state and connects the West Virginia information superhighway to national and international networks within the framework of the national information infrastructure.

Projects being undertaken during the period of July 1, 1997, to June 30, 1999, include the ATM Intranet, which is a statewide, consolidated high-speed multimedia network which connects higher education, K-12 schools, state government, libraries, and health care facilities. WVNET is also continuing its Internet Access Project in an effort to expand the bandwith to the Internet for all public institutions in West Virginia.

THE DRIVING FORCE

The lack of an advanced, statewide telecommunications network has impacted all state agencies and education institutions in West Virginia. Without a centralized planning body, it had been difficult for institutions to obtain the legislative funding and other resources necessary for such an expensive undertaking. With the governor's office placing such a priority on technology development, however, the state now houses a wealth of coordinated planning groups and has produced volumes of strategic plans. Educational telecommunications and technology activities over the next few years will be shaped by the numerous recommendations and projects proposed in the planning documents.

THE PLANS

■ Governor's Office of Technology

In 1997, the Chief Technology Officer released the *1997-2000 Information Technology Plan*, a comprehensive, multi-year planning document that defines each state agency's mission, IT accomplishments, Year 2000 compliance, IT expenditures for FY96 and FY97, and major IT projects to be undertaken between July 1, 1997, and June 30, 2001. For each agency project listed in the document, additional information is provided; such as, the project development type, application type, platform to be used, emerging technology to be used, statutory changes required, public access allowed, number of new full-time equivalents (FTEs), hardware and software requirements, telecommunications impact (voice, data, and other), project schedules, and proposed IT expenditures per project.

Statewide plans for infrastructure in West Virginia target the establishment of an ATM OC-3 backbone. Part of this effort is sponsored by the West Virginia 2001 $3 million grant program that also involves the participation of Bell Atlantic. The program allows institutions with a technology plan and the desire to acquire ATM services to purchase ATM switching equipment for their campuses.

■ K-12

The West Virginia Department of Education (WVDE) oversees three comprehensive initiatives in educational technology, and several smaller programs. Many of the projects are an outgrowth of the October 1995 *West Virginia Educational Technology Plan*, which is due to be updated during the fall of 1998 by a 45-member Technology Task Force. The state technology plan provided for the integration of technology in schools following a "bottom up/top down" dual approach to technology efforts. With only 55 school districts, West Virginia has been able to implement this approach with few problems.

WVDE's Student Utilization of Computers in Curriculum for the Enhancement of Scholastic Skills (SUCCESS) program is an $8.5 million initiative that aims to better prepare students in grades 7 through 12 for postsecondary education and the workplace. SUCCESS provides support for the purchase of computers, software, staff development, and network infrastructure.

The Basic Skills/Computer Education (BS/CE) program targets K-6 children. BS/CE provides hardware and software to elementary classrooms in the state to improve basic technology skills. This program is the result of a proposal passed by the West Virginia Legislature in 1989 to fund a statewide basic skills development project using personal computers in West Virginia schools. Implementation of computers and curriculum began in 1990 with kindergarten and first grade classrooms, and has advanced upward through the grades as resources have become available. More than 18,000 BS/CE student workstations are in use in elementary classrooms and more than 13,000 educators have participated in related training programs.

Schools throughout the state are completing technology plans for review by the WVDE. In addition, funding has been provided on a grant basis to counties to begin installation of technology infrastructures in some schools.

West Virginia is among the states that have recently articulated technology objectives to be mastered by students by the end of the 4th, 8th, and 10th grades. In addition, the State Board will adopt a uniform statewide assessment program to measure student performance by grade level in various subjects.

The West Virginia Legislature has provided funds for multimedia and innovative uses of technology for teacher productivity and student utilization. Fifty-one demonstration sites have been established at schools throughout the state to assist teachers in understanding how to use multimedia in the classroom. The applications range from advanced multimedia to a virtual reality lab. These sites assist other teachers and schools in understanding how to integrate technology into the curriculum.

■ ***E-rate***

Unlike many other states that place the responsibility of filing applications for E-rate funds on schools and school districts, the West Virginia Department of Education is filing a statewide application for E-rate funds. The effort ensures that all schools will benefit from these funds, as well as reduces duplicative efforts among the districts in filing the applications.

Higher Education

In response to Senate Bill 547, the State College and University System began several technology-related initiatives. In its $1 million Technology Assisted Workforce Development Program, the System is creating a technology-based delivery system to enhance higher education's ability to meet the changing needs of the workforce. The System prioritized four programmatic areas to address initially for asynchronous learning and a virtual curriculum model: Manufacturing Supervision, Manufacturing Technology, Emergency Medical Services, and select Governor's Guaranteed Workforce Program training modules. The program's goal is to develop curricula in Manufacturing Supervision, Manufacturing Technology, and Emergency Medical Services in the IPSI format and make them available to all West Virginia educational institutions involved in the delivery of these programs.

Higher Education in West Virginia continues to benefit from an InfoMine grant from the US Department of Education, which began implementation in 1994. The purpose of the grant was to create a State Unified Network (SUN) that linked the West Virginia Academic Library Network with the West Virginia Library Commission's Network and to insure that the users of the new unified network had access to library resources all over the world via the Internet. The project is implementing a new system for Inter-Library Loans which will make the resources of WVU Library open to a wider audience.

West Virginia is a participant in the Southern Regional Education Board (SREB), a consortium of southern states. Planners from West Virginia are involved in developing the SREB Regional Electronic Campus, a regional virtual university.

Three years ago, Senate Bill 300 mandated that college courses must be made available to high schools for dual credit. Colleges in each region of the state were to assume responsibility in making courses accessible. Since passage of SB 300, West Virginia University has used distance education (in addition to other modalities) to create opportunities for high school students to enroll in dual courses.

Marshall University

Marshall University offers distance learning courses through the Instructional Television Services. Marshall University originates four satellite education courses, where a total of 210 student have enrolled. Thirteen T-1 compressed video courses also originate from Marshall and a total of 372 students have enrolled. In addition, students are able to have access to HEITV and downlink educational courses, where the courses are broadcast over public television and the students take their exams on campus for credits. Six courses have been broadcast with 182 total enrollments.

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Bluefield State College

The distance learning program is located in the Bluefield State College Instructional Technology Center. Bluefield State College offers courses via interactive video using microwave and T-1 lines. It links with two other campuses in West Virginia. In the fall of 1998, Bluefield has scheduled approximately eight to 12 courses on interactive video, where an average of 25 to 40 students participates in the development of web-based courses, as well as a packaged program that provides videotaped lectures. In addition, Bluefield State College receives courses via West Virginia Educational Network, which is a satellite downlink.

■ ***West Virginia Northern Community College***

West Virginia Northern Community College is participating in distance learning through the Southern Regional Electronic Campus (SREC). It is scheduled to offer six courses in the fall of 1998 via Internet and telecourses on HEITV, which is public broadcasting.

THE FUNDING SOURCES

■ ***K-12***

The West Virginia legislature allocated $1.2 million in 1996 and the same amount in 1997 in a telecommunications program that provides schools with multimedia computers that have the capability to access the Internet and other communications systems. The computers were placed in classrooms beginning at the high school level first and then moving to junior high, middle, and elementary schools as funds allowed. The computers will be utilized to incorporate multimedia software and CD-ROM packages into the classroom. The units will also be utilized to access the Internet either through the WORLD SCHOOL Program or through other connections. Additional money was appropriated to provide staff development for Internet usage.

The state's Library Commission received a $2.1 million federal grant to place "Infomine" workstations in public libraries and in 55 public schools for access to academic databases and the Internet. One high school in every county has been selected to receive the first installation in the county.

The state received approximately $5 million over a two-year period as part of the Technology Literacy Challenge Fund program. The federal monies will be allocated after state funded programs have been implemented.

As part of the WVDE/IBM Reinventing Education Grant, more than $2 million worth of multimedia software has been distributed to over 340 K-12 schools during the past four years. The software includes multimedia reference tools as well as creative writing and art programs. Staff development workshops are also provided for teachers at selected sites.

■ ***Higher Education***

West Virginia received $2.5 million from the US Department of Education to develop a State Unified Network (SUN) linking the West Virginia Academic Library Network with the West Virginia Library Commission's Network. The legislature in the 1998 general session, at the request of the governor, provided for $1.5 million to defray ATM connections charges for those higher education entities connecting to the ATM from July 1 to June 30, 1999.

TECHNOLOGY

■ *Statewide Networks*

Currently, the statewide infrastructure consists of several networks. The state operates a frame relay, multiple T-1 backbone that offers 56Kbps dedicated connections to various state agencies, schools, and institutions of higher education. Most Internet service is provided through WVNET - a network managed by the State Colleges and Universities System. Two Internet Pops are being upgraded in the summer of 1998, which will double WVNET's current capacity to 34 Mb each.

■ *K-12*

More than 80 percent of public schools have dedicated 56Kb frame relay connections to the state backbone. Internet connectivity efforts are sponsored through the Bell Atlantic World School program. The bandwidth to schools will be upgraded through the E-rate program to a full T-1, as needed. There are approximately 30 schools in the state without Internet connectivity, located in areas served by local phone companies. The WVDE is working with the phone companies to establish connections to the schools.

West Virginia houses two networks expressly for educators. WVEIS network is an administrative network connecting schools, county administrative offices, and the Department of Education to provide electronic mail and file transfer. All 55 county schools' administrative offices are connected to the network. The West Virginia Microcomputer Education Network (WVMEN) has provided a toll-free statewide electronic bulletin board since 1982 for more than 9,000 educational and community users. The system provides electronic mail, bulletin, and conference areas, public domain software, and general communication. Plans are underway to add PBS Learning Link, and science/math PSINET. In addition, the WVMEN is being upgraded to assist with the problem of unequal access to the Internet for those schools not served by Bell Atlantic or other telephone companies.

■ *Educational Broadcast Authority*

The EBA operates a 15 year old microwave delivery system, which is expected to be phased out as the state's ATM system is implemented. The EBA provides the transmission mechanism for the state's SATNET and also leases space on its backbone to higher education and other institutions.

■ *Higher Education*

West Virginia University, the state's land grant institution, operates two compressed video networks. MDTV, the Mountaineer Doctor Television serves medical and healthcare needs at 17 sites in the state, operating at full T-1 transmission speeds. IVIN, the Interactive Video

Network, serves 11 sites and operates at transmission speeds of 1/2 T-1. Both of these are interconnected, are used for a number of purposes, and utilize dedicated leased lines.

West Virginia University uses compressed video, satellite, web, and tape delivery, as well as a number of live face to face courses delivered at a distance. As the number of compressed video sites increases, so has the demand for distance learning in the state.

SATNET is a satellite telecommunications system developed by the State College and University System of West Virginia. SATNET delivers one-way video/two-way audio instruction that supplements on- and off-campus courses to more than 2,500 students each year. The system includes 26 higher education receive sites tied to a C-band uplink in Institute, West Virginia.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Although West Virginia is small in size, it is one of the few states without a true statewide telecommunications network. For educators at all levels, it is generally good news when a governor elevates technology and telecommunications planning. It is still too early to assess how, and how well, the statewide planning efforts in West Virginia will turn out. Top down coordination brings its own set of challenges for which many individuals, agencies, and institutions, including educators, are ill-prepared. With only 55 school districts and 26 institutions of higher education, West Virginia's educators have been used to carrying out their planning activities within a relatively small circle of stakeholders. Amid the technology planning groups that have emerged over the past two years, educators must now fight to make sure that the needs of schools and other institutions remain at the forefront of discussions.

WISCONSIN

ACRONYMS AND NETWORKS

- DOA—Department of Administration
- DPI—Department of Public Instruction
- TEACH WI—Technology for Educational Achievement in Wisconsin
- UW—University of Wisconsin
- UW-System—University of Wisconsin System
- WADEN—Wisconsin Association of Distance Education Networks
- WATF—Wisconsin Advanced Telecommunications Foundation
- (Wisconsin ECB)—Wisconsin Educational Communications Board

EXECUTIVE SUMMARY OF THE STATE

Wisconsin has taken strides to coordinate the numerous educational telecommunications and technology activities that have been independently operating throughout the state. During the 1997-99 biennium, TEACH Wisconsin, an initiative stemming from the governor's office, will allocate $210 million in the form of grants and loans to schools, libraries, higher education institutions, and other education-related organizations interested in enhancing their telecommunications capacity. TEACH Wisconsin addresses access wiring, training, and collaboration. Through the TEACH Wisconsin funding, educators will be able to take advantage of BadgerNet, the state's new voice, data, and video network, which is currently under development by the Department of Administration.

RELEVANT BACKGROUND AND A BRIEF HISTORY OF THE CURRENT PROGRAM(S)

Like many other states in the Midwest, Wisconsin has been a place where telecommunications initiatives have been pursued for a number of years at all levels of education, but with limited communication and coordinated planning. Until recently, the wealth of public K-12 regional ITFS systems in the state have operated separately, side-by-side with the well-conceived activities of the Wisconsin Educational Communications Board and the University of Wisconsin System.

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Department of Administration (DOA)***

The DOA's Division of Technology Management provides a business and information technology planning model for use by all state agencies. The division also assists agencies in data processing and telecommunications planning, coordinates information technology procurement, operates statewide telecommunication networks, and establishes statewide technology standards and guidelines.

■ *State of Wisconsin Department of Public Instruction (DPI)*

The state of Wisconsin Department of Public Instruction (DPI) is a state agency that oversees Wisconsin's public elementary and secondary education system and the state's public library system. The department helps the 426 local school districts in Wisconsin to create challenging curriculum and instructional programs for nearly 1 million students. DPI's Division for Libraries and Community Learning provides leadership, services, and advocacy for access to and effective use of information, resources, and instructional technology in Wisconsin PK-12 schools.

■ *Technology for Educational Achievement (TEACH WI)*

TEACH Wisconsin, an initiative originally stemming from the governor's office, is designed to accelerate the use of technology by schools, libraries, colleges, and universities to eliminate barriers of time and distance in education delivery and to advance education into the 21st century. TEACH was signed into law in October 1997. TEACH provides support for educational technology and telecommunications access for eligible organizations through five programs. TEACH also participates in statewide planning activities such as convening an Ad Hoc Video Distance Educational Technology Committee to advise the state regarding technology options for two-way video distance learning. In addition, in cooperation with he Division of Information Technology within the state's Department of Administration, TEACH will work with K-12 schools to develop functional guidelines for desktop hardware and software in support of the goal of statewide district compatibility and efficient exchange of information. TEACH's activities are overseen by a nine-member board, which includes the state Superintendent of Public Instruction, the Secretary of the Department of Administration, a member of the Board of Regents, a member of the Wisconsin Technical College System Board, a member of the Educational Communications Board, and four public members.

■ *University of Wisconsin System (UW)*

The system's Working Group on Instructional Technology and Distance Education makes recommendations concerning the system's planning and direction. The overarching goal of this working group is the use of instructional and distance education technologies to develop and enhance the student-centered learning environment and remove the barriers of time and place for students.

■ *Wisconsin Educational Communications Board*

The Wisconsin Educational Communications Board (Wisconsin ECB) has assumed a leadership position in the state's telecommunications discussions for a number of years. The mission of the Wisconsin ECB is to provide a statewide telecommunications system and assistance in the diffusion of advanced technologies in support of education and of public broadcasting. The 16-member Board includes representatives from public and educational interests, as well as from the executive and legislative branches of state government. Board membership includes: three public members appointed by the governor; the president of the University of Wisconsin (UW) System, the director of the Wisconsin Technical College System, the state superintendent of the Department of Public Instruction, the secretary of the Department of Administration, or their designated representatives; an appointee of the UW Board of Regents and an appointee of the Wisconsin Technical College System Board; two members appointed by the governor to represent public and private education; the president of the Wisconsin Public Radio Association; and four members of the legislature

■ ***Wisconsin Association of Distance Education Networks (WADEN)***
WADEN was formed in 1997 with the goal of encouraging all distance education networks in the state to work collaboratively to improve distance education opportunities for all Wisconsin learners. More than 30 operating networks participate in WADEN.

■ ***Wisconsin Advanced Telecommunications Foundation (WATF)***
The WATF is a public-private partnership and non-stock/non-profit corporation established in 1993 by Wisconsin Act 496 (Information Superhighway legislation), which became effective January 1, 1995. The WATF raises private sector, government, and foundation funds to build an endowment to support advanced telecommunications-based projects and efforts to educate Wisconsin's residents, businesses, and institutions about the benefits of advanced telecommunications applications. The WATF oversees two funds. The first is an endowment trust fund, which the WATF intends to capitalize with $25.5 million within seven years from the state of Wisconsin and Wisconsin's telecommunications providers. In addition, the WATF has established a fast start trust fund. Since June 1995, the WATF has received $12.38 million in total cash and in-kind contributions. An 18-member, governor appointed board of directors oversees the WATF, and the Secretary of the Department of Administration serves as the board's president. These funds are distributed by competitive grants with a maximum of $50,000 or $25,000 per member of a consortium.

THE DRIVING FORCE

Connectivity and money will fuel the educational technology and telecommunications activities taking place in the state over the next several years.

THE PLANS

■ ***TEACH Wisconsin***
During the 1997-99 biennium, TEACH's five programs will provide $210 million to support technology and telecommunications projects at all levels of education. TEACH Wisconsin's Educational Telecommunications Access program will provide a minimum level of telecommunications access for a maximum price of either $100 per month (for a T-1 line) or $250 per month (for other types of data lines and video links). Public school districts, public library boards, private schools, private colleges, tribal colleges, and technical college districts are eligible for this program. TEACH's telecommunications access program has enabled 71 public and three private K-12 schools and all 16 technical colleges to receive new

video links at a subsidized rate of no more than $250 per month. This access portion of the TEACH program has also provided 171 public and 21 private K-12 schools with new T1 data lines at a subsidized rate of no more than $100 per month.

In its Educational Technology Block Grants, TEACH will provide public school districts $62 million in noncompetitive funds during a 24-month period. To apply, school boards must hold annual meetings and approve and carry motions requesting block grant monies. Through its Wiring Loans program, TEACH will make funds available to school districts and public libraries to upgrade electrical wiring and install computer network wiring. Grants for Technical Assistance and Training will be awarded to CESAs and consortia through a competitive application process. Finally, Pioneering Partner Grants will support school districts and public libraries.

■ ***E-rate***

Public and private schools, and public libraries in Wisconsin will individually file for E-rate funds. The Department of Public Instruction has been working with the Department of Administration, the Public Service Commission, the Educational Communications Board, the Wisconsin Education Association Council, the Wisconsin Association of Nonpublic Schools, the School Administrators Alliance, Milwaukee Public Schools, and the CESAs to create and disseminate information about the E-rate to schools and public libraries. As of August 1998, 265 public schools districts out of a total of 426 (62 percent) and 90 public libraries out of a total of 381 (24 percent) had applied for federal E-rate.

■ ***Higher Education***

■ ***University of Wisconsin System (UW)***

The University of Wisconsin System consists of two doctoral research universities, 11 four-year universities, 13 freshman-sophomore centers, and statewide Extension. In August 1995, the Board of Regents of the University of Wisconsin System began a 10-month study to examine and address the key challenges facing public higher education in Wisconsin during a time of competing demands for state resources. Its final report, Study of the UW System in the 21st Century, identified distance education and instructional technology as key tools for meeting the changing needs of the system's students. Based on the recommendations from this report, the UW System forwarded a request for new instructional technology and distance education funding as part of its 1997-99 biennial budget request that included components for improved access to hardware and software, faculty/staff development, collaborative programming, and student support services.

■ ***Wisconsin Educational Communications Board (Wisconsin ECB)***

In March 1998, Wisconsin ECB approved its *1998–2001 Strategic Plan.* In its plan, the Wisconsin ECB identified four strategic directions the agency will pursue during the next three years. Its first strategic direction is most pertinent to statewide telecommunications planning: to be a resource for products, services, and technical assistance regarding educational telecommunications and other technologies supporting the educational and public broadcasting communities. To this end, ECB will provide appropriate, timely, and innovative statewide technical, facilitative, and telecommunications resources to support instructional and broadcast technologies. Second, ECB will provide television and radio programming of quality that reflects the educational and cultural interests and needs of the people of Wisconsin. Third, ECB will develop and maintain effective collaboration with public and private educational and cultural entities. Finally, ECB will work to maintain state-of-the-art technical facilities, adopting new technologies whenever appropriate.

■ ***Technical Colleges***

Wisconsin is divided into 16 regional college districts with a total of 46 campuses and numerous outreach centers statewide. The Technical College System delivers courses to its two-year technical colleges in Wisconsin via telecourses, Internet, interactive television, and satellite downlinks. The System serves 14,000 people every year via telecourses. In addition, each individual technical campus has its own distance learning programs and different ways to deliver the courses.

THE FUNDING SOURCES

■ ***K-12***

■ ***TEACH Wisconsin***

TEACH Wisconsin anticipates distributing over $12 million as part of its Educational Telecommunications Access program. The educational telecommunications access portion of TEACH Wisconsin is financed by the state's universal service fund, which is raised by the Public Service Commission through an assessment on the state's telecommunications providers. As part of its Educational Technology Block Grant program, TEACH will distribute $62 million ($27 million in 1997-98 and an additional $35 million in 1998-99) to all 426 school districts in the state through a formula process. The Wiring Loans program makes $100 million available per year to school districts, and $10 million per year to public libraries. School districts and libraries will be required to pay back 50 percent of the original loan amount. A total of $6 million in technical assistance and training grants will be awarded over a two-year period to CESAs and consortia. Pioneering Partnership Grants, one time only grants, totaling $5 million will also be distributed to school districts and public libraries.

■ ***Technology Literacy Challenge Funds (TLCF)***

In fiscal year 1997, $3.4 million in TLCF funds supported 20 initiatives focusing on professional development. Wisconsin received a total of $6.8 million in TLCF funds in fiscal year 1998. Ninety-five percent of TLCF funds are allocated through the Department of Public Instruction (DPI) to school districts. In FY '98, sixty-one applications were chosen to receive funding. This will impact more than 3,200 teachers and more than 573,000 students in 153 school districts. Applicants were allowed to address any or a combination of the four federal goals, but at least 30 percent of each project is required to focus on support and training for professional development.

■ ***Wisconsin Advanced Telecommunications Foundation (WATF)***

The WATF awards endowment funds and fast start funds in three annual award cycles. In 1997, the foundation awarded a total of $9.5 million, and in 1998 it granted a total of $16.5 million. Eligible applicants receiving priority consideration include educational institutions (public, private, K-12, post-secondary), libraries, and local government units. Additional priority is given to public school districts with allowable revenues per pupil below the statewide average. Also allowed to apply for funds are: cable TV public, education, or government access facilities; health care information services; state government agencies; people or organizations located in Wisconsin; and consortia of two or more of the above. The WATF preferentially awards projects whose cash grant requests do not exceed $50,000. In order to obtain funding, an applicant must submit a strategic plan on information technology and telecommunications. Among the funding considerations the WATF looks for projects that: demonstrate cooperative, advanced, and innovative telecommunications-based applications; meet a demonstrated need; do not compete with the private sector in the deployment of telecommunications infrastructure; promote the effective, advanced, and innovative use of the telecommunications; and educate telecommunications users about advanced and innovative telecommunications technologies, applications, and alternatives.

TECHNOLOGY

■ ***BadgerNet***

The Department of Administration (DOA) oversees BadgerNet, a voice, data, and video network for use by all state agencies, local governments, UW campuses, technical colleges, private colleges and universities, public and private K-12 schools, libraries, and other authorized entities. BadgerNet delivers multiple channels of full motion video, high fidelity audio, and high speed data to and from sites throughout Wisconsin via a statewide network. The data network relies on a SONET backbone with 12 nodes connected to the DOA. Full motion video is provided over a DS-3 network and 22 digital switchers. BadgerNet offers four video channels (one transmit and three receive channels), two high speed data (up to 19.2 kbps) channels, one T-1 Internet connection, one T-1 data connection. Two other T-1 connections may be added in the future. Phase I of BadgerNet commenced in August 1998. Upon completion of Phase I, more than 300 sites throughout the state will have been connected to the network. Public and private K-12 schools, libraries, and colleges will be able to take advantage of BadgerNet's services at reduced cost levels through the TEACH WI initiative.

■ ***University of Wisconsin***

UW-Extension Instructional Communications Systems manages the Educational Teleconference Network (ETN), a two-way dedicated audio network available through dedicated telephone lines in over 170 sites around the state of Wisconsin including all UW campuses, county extension offices, libraries, and hospitals. UW-Eau Claire relies on a T-1 video link between UW-Eau Claire and the Marshfield Clinic in Marshfield, Wisconsin to deliver nursing courses. It is a two-way audio and video link using T-1 NEC video codecs with transmission facilities provided by telephone.companies.

A number of UW campuses also participate on the Wisconsin Overlay Network For Distance Education Resources (WONDER) network, a consortium of five University of Wisconsin campuses and four Technical Colleges. WONDER is a dedicated, fiber optic based DS-3, two-way audio and video network capable of data and voice, and expandable to additional channels. WONDER is capable of interconnecting with the Northern Wisconsin Educational Communication System (NWECS) and West Wisconsin Instructional Networking Group (WestWING).

■ ***Wisconsin Educational Communications Board***

Wisconsin ECB licenses 15 ITFS systems in the state on behalf of educational institutions, state agencies, and health care facilities. While most of the ITFS systems rely on one-way video and two-way audio signals, some have two-way video capabilities. One system, the Fox Valley Technical College ITFS system, plans to use T-1 compressed video to reach four of its sites. The Wisconsin Educational Communications Board also operates a dual-thread, steerable, analog uplink, located in Madison, Wisconsin. The ECB is able to transmit to Ku-band receivers, and can facilitate transmission to C-band receivers. Among the educational programming distributed via the ECB's uplink are: graduate-level courses for the University of Wisconsin-Madison's School of Engineering, workshops on a range of topics offered by UW-Extension, and professional development programming produced by the Satellite Educational Resources Consortium (SERC).

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Wisconsin's educational telecommunications activities are becoming a fascinating blend of centralized planning and regional consortia. Given Wisconsin's considerable investment in the regional partnerships, it is doubtful that the state will come to assume a greater role in coordinating the initiatives, even with the advent of BadgerNet. It is interesting to note that unlike the situation in states such as Nevada, TEACH, the most recent legislation targeting telecommunications and technology, does not attempt to impose any sets of requirements concerning cooperation among K-12 schools, institutions of higher education, and other entities.

WYOMING

ACRONYMS AND NETWORKS

- A&I—Department of Administration and Information
- CCC—Community College Commission
- UW—University of Wyoming
- WDE—Wyoming Department of Education

EXECUTIVE SUMMARY OF THE STATE

Wyoming is embarking on the construction of its new educational telecommunications network, which US WEST will build and manage. The cost of this network is approximately $18 million over a five year period. The state legislature appropriated money to cover the cost for the first two years (1998-99), and will need to appropriate additional money for each subsequent biennium to cover ongoing costs. Installation of the network should be completed by the summer of 1999.

A number of technology planning documents have provided the basis for the network's purpose and goals for usage. The *Department of Administration and Information (A&I) 1995 Plan*, Wyoming's Strategic Direction for Information Technology, created a general framework for state agencies' technology planning. The Wyoming Department of Education (WDE) took advantage of this framework as its Technology in Education Panel authored the *Wyoming Education Technology Plan (WETP)* in 1997. Building on the existing infrastructure of the state's seven community colleges and the University of Wyoming, the new statewide network will enable the postsecondary institutions to increase their distance education services.

RELEVANT BACKGROUND AND BRIEF HISTORY OF THE CURRENT PROGRAM(S)

The state's progress in creating a statewide educational telecommunications network has its roots in a 1995 Wyoming Supreme Court equity ruling. In Campbell County School District v. State, the state called for a revision of the funding structure for public education. This action led the state legislature to establish six joint committees, which drew upon both houses of the legislature and examined different issues related to equity. Three of the joint committees specifically addressed technology in education in their recommendations. For example, the Joint Education Committee reasoned that the "basket of education" to be funded for school districts includes applied technology as part of the common core of knowledge and skills that all school districts must address in their performance standards. The School Capital Construction Committee, meanwhile, saw a need to address technology as part of the standards for new construction. The Joint Corporations Committee introduced legislation which resulted in two laws being passed during the fifty-fourth legislative session, House Enrolled Act No. 25 and House Enrolled Act No. 48, which were signed into law in February 1997. House Enrolled Act No. 25 directed the State Superintendent of Public Instruction to oversee the development and implementation of a statewide educational technology plan. House Enrolled Act No. 48 provided for: ❶ the issuance of a Request for Proposal to implement technology in education, specifically, data transmission connectivity to every school building in the state by July 1, 1999; and ❷ provide for interactive two-way video capability to each high school in the state by July 1, 2001. A Technology in Education panel was subsequently created under the auspices of the Wyoming Department of Education (WDE), and included the participation of representatives from WDE, the Wyoming Community College Commission, the Telecommunications Council, Central Wyoming College, the University of Wyoming, and the Department of Administration and Information (A&I).

THE STATE'S CURRENT SITUATION/CLIMATE REGARDING DISTANCE LEARNING/EDUCATIONAL TECHNOLOGY

THE PLANNING GROUPS

■ ***Department of Administration and Information (A&I)***

The Department of Administration and Information (A&I) acts as the central coordinating body for networking within in the state of Wyoming. In July 1995, the department combined the divisions of Computer Technology and Telecommunications into a single division of Information Technology. The Division of Information Technology, under one administrator, assumes responsibility for the day-to-day operations of both computer technology and telecommunications, including implementing systems that have been thoroughly reviewed and approved. The division's Information Planning and Coordinating Office, headed by a Chief Information Officer (CIO), is responsible for strategically planning the use of technology and the overall coordination of that effort with state agencies, ensuring that proper planning is done prior to implementation of new technology. The Information Planning and Coordinating Office reviews all information technology grant applications of state agencies to ensure compatibility and avoid duplication of systems and services. The CIO oversees the development, dissemination, and updating of the state's *Information Technology Plan.* The CIO serves as liaison with the governor, his staff, Wyoming's elected officials, state agencies, and the state education department to promote cooperation and make recommendations regarding information resources.

■ ***Wyoming Telecommunications Council***

The Wyoming Telecommunications Council was formed in 1994 by an act of the legislature, with members appointed by the governor. The council is charged with developing long- and short-range goals and plans to meet the telecommunications needs of the state and its citizens; creating an inventory of current telecommunications infrastructure; soliciting comments and recommendations on needs, practices and technologies for providing telecommunications services in the most efficient manner possible; accommodating economic growth and development in the state; and enhancing educational opportunities at all levels of instruction.

■ ***Wyoming Department of Education (WDE)***

The mission of the Wyoming Department of Education (WDE) is to lead, model, and support quality improvement of education for everyone in Wyoming. In its overall strategic plan, WDE established the goal of developing and implementing a WDE and *State Technology Plan*, which addresses staff training, curriculum integration, ubiquitous network connectivity, and equal access to information resources. To this end, the WDE brought together a Technology in Education panel representing K-12 education, the Community College Commission, the University of Wyoming, and the Department of Administration and Information to develop a single, comprehensive plan for educational technology in the state. WDE also led the state's Education Technology Project, an initiative to select a vendor to create a statewide educational telecommunications network.

■ ***University of Wyoming (UW)***

The University of Wyoming is the state's sole four-year institution. The university therefore assumes responsibility for delivering upper division and graduate courses and degree programs statewide. The university offers distance learning to students using different modes of communication. The university delivers more than 80 courses via traditional correspondence study, primarily using print-based materials. The university also relies on audio teleconference technology to deliver off campus courses. Through an effort involving the state Department of Administration and Information (A&I) and the seven community colleges, UW established a compressed video network that distributes more than 30 courses across the state.

■ ***Community College Commission (CCC)***

The seven-member commission sets state policy for Wyoming's seven community colleges, each of which is governed by a separate board of trustees. The seven locally elected boards of trustees are assigned specific powers and duties, and set policies for the management and operation of their individual college districts. The state's community college districts are defined by service areas. The community colleges have independently planned and followed their own distance education initiatives. Several colleges offer pre-produced telecourses over Wyoming Public Television, and taped courses for distribution. All seven colleges serve as host sites for the state's compressed video system, and all have direct satellite downlinks.

THE DRIVING FORCE

Wyoming's approach to technology planning has been resoundingly top-down. In a state which has historically valued local control in government and education decision making, this stance may not be seen as the most effective. In order for educators to buy into the network and technology initiatives, the state will have to work with the grassroots organizations and anticipate some resistance to its plans.

THE PLANS

■ Department of Administration and Information (A&I)

In July 1995, the Department of Administration and Information (A&I) created a plan to improve coordination of the state's information technology requirements. Its document, *Wyoming's Strategic Direction for Information Technology*, provided a general framework under which other agencies' specific plans, such as the Wyoming Department of Education's *Education Technology Plan*, could be developed and implemented. The *Wyoming's Strategic Direction for Information Technology* document pointed out that because of the state's great distances and sparse population, Wyoming is a high-cost state for telecommunications providers. Therefore, competition among telecommunications providers needed to be encouraged. The document reinforced the need for partnerships, and communication among all entities, and the need for the state to develop an information infrastructure based on voice, video, and data.

■ Wyoming Telecommunications Council

In 1996, the Wyoming Telecommunications Council released its report, *Bridling Expanse*, which summarized information on Wyoming demographics and the existing regulatory climate, as well as an inventory of existing public and private telecommunications facilities and projects. Among its conclusions, the council noted that it might be counterproductive for the public sector to own and operate exclusive systems when open for profit systems can provide benefits to more citizens. The council pointed out that the most appropriate role for the public sector might be as an anchor tenant on a private telecommunications network. The council also underscored its belief that no single transmission technology is necessarily correct for every application in Wyoming.

Throughout 1997 and 1998, the council's most pressing issues included participating in the Technology in Education panel that developed and evaluated Requests for Proposals for a statewide educational technology infrastructure. The council also worked with the Wyoming Community College Commission to release one-half of the seven community colleges' assigned IP addresses to the Department of Administration and Information. These addresses were made available for assignment to the K-12 school districts for use in their local area networks.

■ K-12

The state's Education Technology Project awarded a contract to US WEST Communications in April 1998 to design and construct a statewide, high speed data and video network to connect all Wyoming public schools. The construction of the network began in July 1998 and will continue over a one-year period. US WEST will provide and maintain networking equipment and will manage the network on behalf of the state. To prepare schools and school districts for the network, the Wyoming Department of Education (WDE) and US WEST traveled throughout the state in a series of "road shows" during the spring of 1998 to explain the details of the project, answer questions, and provide advice on how school districts can best prepare for the implementation.

In 1997, WDE's 45-member Technology in Education Panel released its *Wyoming Education Technology Plan (WETP)*, in fulfillment of the legislative mandate detailed in House Enrolled Act No. 25. The plan addresses the needs of the state's current educational climate, and also outlines the state's future technology needs. Six goals organize the state's technology plan: ❶ to pool educational resources and expertise for the state's higher education institutions and K-12 districts; ❷ to establish regional information technology centers; ❸ to prioritize federal funding; ❹ to strengthen the cooperative, interdependent relationships among educational entities; ❺ to coordinate professional development and curricular improvement within and among the regional centers; and ❻ to coordinate community access to information technology training and services.

The plan identified five key components to be addressed by educational technology plans in Wyoming, components that were taken up in the Wyoming Department of Education's Goals 2000 project. Goal 2000 activities complemented the vision articulated in the WETP by encouraging the development of school districts' technology plans. The districts' technology plans must include a tie to the community being served, and be compatible for connectivity to the state network for information transfer via voice, data, and video. School districts submitted technology plans in March of 1997.

As part of the Mountain Plains Distance Learning Partnership, a Star Schools initiative targeting native Americans and disadvantaged students and awarded to Wyoming's Public Broadcasting affiliate, KCWC-TV, four schools in Fremont County will have access to educational programming beginning in 1998. In the initiative's second phase, the project will be expanded to eight additional schools in Fremont, Hot Springs, and Teton Counties. Phase III will link schools in Southwest Colorado's Cortez County and Utah's EdNet. While the EdNet link will provide programming throughout Utah, the primary focus of this Star Schools initiative is on southwest Utah. Phase IV will involve a connection between KCWC-TV and the University of Great Falls, in Great Falls, Montana.

■ *Higher Education*

The University of Wyoming (UW) is expanding its distance education efforts to include Internet delivery of off-campus programming. UW constructed computer labs and the appropriate connections in several sites throughout Wyoming to prepare for greater Internet activity. The computer labs support off-campus courses delivered via audio teleconferencing and compressed video, as well as serve as a delivery mechanism for multimedia developed courses. UW also increased its network bandwidth between Laramie and Cheyenne to T-3 capacity, which will enable UW to expand its number of multiplexed T-1 lines without incurring any additional transmission line or hardware costs between the two sites. The

University of Wyoming is also a charter member of the Internet2 Project consortium, and is a member of the Western Governors University initiative.

■ ***Community Colleges***

■ ***Laramie County Community College***

Laramie County Community College offers students telecourses and courses via Internet, compressed video, and satellite downlinks. In the spring of 1998, Laramie offered four courses over the Internet, completed by a total of 88 students. Again, in the spring of 1998, five courses over compressed videos were offered and 79 students completed them. Fifteen telecourses were offered in the spring of 1998 and 220 students completed the courses. Laramie distance learning program will expand the number of telecourses and courses offered via Internet in the fall of 1998.

■ ***Central Wyoming Community College***

Central Wyoming Community College provides telecourses, video-taped courses, courses offered via Internet and compressed video that are delivered from University of Wyoming. Only one Internet course was offered in the spring of 1998, but five courses will be offered in the fall of 1998. Central offered approximately 12 to 15 video-taped classes and 10 telecourses in the spring of 1998.

THE FUNDING SOURCES

■ ***Statewide Network***

The cost of the statewide network is expected to be $26 million over an eight-year period. During the first two years, $9 million has been appropriated by the state legislature, and will be spent on network development and connectivity charges. An additional $2 million will support the network's video component. Another $7 million will be needed for 2000 to 2002, and $8 million for the years 2003 to 2005. These future funds will be used for training and development, maintenance, and further networking.

■ ***K-12***

The state of Wyoming combined its Technology Literacy Challenge Fund (TLCF) grants with its Goals 2000 funds. In 1997, Goals 2000 funds totaled $1.2 million while the state received $1 million in TLCF funds. In 1998, Wyoming will receive $1.7 million from Goals 2000 and $2 million from TLCF. The Goals 2000 awards support school improvement, standards, and assessment through the use of technology. Prior to the release of the Wyoming Educational Technology Plan and the award for the US WEST network, grant recipients sought TLCF funds for the development of WANs within school districts. To avoid duplication of US WEST project efforts, grant applications have been reframed to support the development of LANs, classroom wiring, and staff development.

KCWC-TV received a Star Schools grant of $10 million for its three-state initiative, the Mountain Plains Distance Learning Partnership. The overall goal of the project is to provide educational programming to native Americans and disadvantaged students in Wyoming, Colorado, and Utah.

TECHNOLOGY

■ *Statewide Network*

The new data network built by US WEST includes Asynchronous Transfer Mode-Cell Relay Service with DS-1 service (ATM CRS) from regional centers to all high schools for interactive video and high speed, near real-time data transfer. The network will include dedicated T-1 lines into the state's 75 high schools, while elementary schools will receive a minimum of 56 Kbps. The network will build on the existing infrastructure currently utilized by the state's community colleges and the University of Wyoming, upgrading the institutions' bandwidth from T-1/DS-3 to OS-3. Through the upgraded network connections, UW and the community colleges will be able to deliver more distance education courses. The network will be a combination of private and leased lines and switches. The state owns five of the nine switches located at community colleges, and will act as the ISP provider. In addition to providing courses and professional development sessions, the network will include management data services, or MDS. Through MDS, the Wyoming Department of Education will be able to follow communication traffic flow, information that will be helpful for WDE's and A&I's decision making concerning network upgrades and data collection.

■ *KCWC-TV*

KCWC, the state's Public Broadcasting affiliate offers twenty telecourses and one complete degree program in General Arts and Sciences in collaboration with the state's community colleges. Educational programs are delivered directly to the home over a digital network with MPEG-2 quality. In addition to telecourses, the station also provides asynchronous web-based courses. Most of these latter courses are part of a surgical technology program, and additional courses are being developed for a nursing home.

HEZEL ASSOCIATES' COMMENTS AND CONCLUSION

Consider the situation Wyoming's students face. At 98,000 square miles, Wyoming is the ninth largest state, while its population of 475,981 is the smallest in the nation. Approximately 35 percent of the state's citizens live in towns of less than 2,500 people. Over 70 percent of the land within Wyoming is the property of the federal government, which means that state taxing authority is limited to less than 30 percent of the state's area. These conditions contribute to vast differences in the resources available to the state's students and educators. Just as Kentucky determined several years ago, Wyoming has reasoned that using technology is an appropriate means to redress education inequities. Although details concerning the new statewide network's physical appearance are known, less clear is how the network will be used. Over the next year, as construction takes place, state agencies and other planners will face issues of training, curriculum development, and technology integration, the same issues with which other states struggle. What Wyoming has in its favor is the multi-agency collaboration that resulted in the creation of the state network and the distance education experience of the state's community colleges and university. Whether the community colleges will be able to expand their expertise to reach out to high schools and provide a link to the University of Wyoming will be critical in how effectively the state uses its new network.

Educational Telecommunications and Distance Learning:
The State-by-State Analysis 1998-99

Glossary of Interstate Educational Telecommunications and Distance Learning Providers and Technological Terms

HEZEL
ASSOCIATES

GLOSSARY OF INTERSTATE EDUCATIONAL TELECOMMUNICATIONS PROVIDERS

The focus of *Educational Telecommunications and Distance Learning: The State-by-State Analysis, 1998-99*, as its name implies, is on statewide telecommunications activities. In addition to projects within states, multi-state and national telecommunications activities that have been organized during the past several years. The following is an abbreviated list of the regional initiatives, organizations, and major partnerships that have emerged involving educational telecommunications.

A*DEC

The A*DEC organization provides distance education programs and services that are both economic and high quality. This international consortium of state universities and land grant institutions uses the most up-to-date and suitable information technologies. A*DEC focuses primarily on programs in the areas of: ❶ food, nutrition, and health, ❷ community and economic development, ❸ distance education and technology, ❹ environment, agriculture, and natural resources, and ❺ youth and families. The A*DEC goal is to become the principle leader in the provision of, and access to distance education that is customer driven.

ANIR

ADVANCED NETWORKING INFRASTRUCTURE AND RESEARCH

ANIR is a division of the National Science Foundation (NSF). Since 1986 ANIR has advanced and supported inter-institutional computer networking for research and education. Connections to the Internet are supported by ANIR for research and education. The goal of this support is to establish and enhance computer networking infrastructure. The National Science Foundation generally provides $15,000 grants to approved organization to connect the organization to the Internet.

ASTS

ARTS AND SCIENCE TELECONFERENCING SERVICE

Oklahoma State University received Star Schools funding in 1988 and created the Arts and Science Teleconferencing Service (ASTS), a non-profit corporation, to oversee K-12 programming. ASTS is a partnership of rural school administrators, the Oklahoma Department of Education, and the College of Arts and Sciences at Oklahoma State University. The service provides live secondary school programming via satellite in math, science, and language to approximately 425 schools and its ad hoc programming reaches more than 900 institutions.

ANNENBERG/CPB PROJECT

Established in 1981 with funds from Walter Annenberg, the project has been based at the Corporation for Public Broadcasting (CPB). Originally designed to assist in the improvement of and access to higher education, Annenberg/CPB funded numerous high quality video telecourses as well as new technology projects and the New Pathways to Degree Initiative. Now know as the Annenberg/CPB Math and Science Project, the Project has adopted the goal of implementing widespread reform of math and science education through technology.

CABLE IN THE CLASSROOM

Cable in the Classroom is a non-profit service of the cable industry that provides free installation and basic service to all public junior and senior high schools passed by cable. In addition to free non-commercial programming, schools receive support materials and copyright clearances through Cable in the Classroom participation.

DLRN

DISTANCE LEARNING RESOURCE NETWORK

The DLRN, a WestEd project, was established through funding by the Star Schools Dissemination Project. Policy makers, teachers, school administrators, and parents who are interested in effectively establishing a distance education program can use the DLRN as a reliable source of information.

E-RATE

The Telecommunications Act of 1996, sponsored by the Federal Communications Commission, established the E-Rate, otherwise known as the Universal Service Fund. The E-Rate consists of a $2.5 billion fund that is distributed among schools and libraries upon approval. The purpose of the funding is to help schools and libraries defer the costs of accessing the Internet. All schools and libraries may apply for the funding.

GOALS 2000

The Goal 2000: Educate America Act was signed into law on March 31, 1994 by President Clinton. Goals 2000 is a program aimed at the achievement of a number of educational goals. The program supports a number of educational initiatives including high academic standards for all students, safer schools, expanded access to computers, and improved professional development. The Act establishes educational goals that are to be met by the year 2000. Among the goals are: ❶ achieve school readiness, ❷ increase school completion, ❸ emphasize student achievement and citizenship, ❹ become the worldwide leader in math and science, ❺ achieve adult literacy, ❻ ensure that schools are safe, ❼ provide professional development and education for teachers, and ❽ increase parental involvement in education

400

INFORMATION INFRASTRUCTURE TASK FORCE

Formed in 1992 to articulate and implement the Clinton administration's vision for the National Information Infrastructure (NII); the IITF is composed of high level representatives from federal agencies involved in the development and applications of information and telecommunications technologies.

JONES EDUCATION COMPANY: INTERNATIONAL UNIVERSITY COLLEGE

The International University College offers programs that are designed for busy adults. The College provides adults with the opportunity to complete continuing education courses and earn a Bachelor's or a Master's degree via the Internet. The two degree programs are in business communications.

JONES EDUCATION COMPANY: MIND EXTENSION UNIVERSITY

ME/U delivers educational programming with the cooperation of cable television systems throughout the US. ME/U offers for-credit undergraduate and graduate courses from major universities, including two complete degree programs.

MCET

MASSACHUSETTS CORPORATION FOR EDUCATIONAL TELECOMMUNICATIONS

MCET is an independent public corporation established by stature in 1982 and funded by the state legislature. MCET produces and distributes K-12 instructional programs through the Mass Learnpike, its satellite network, and the Mass LearnNet, its computer network. MCET has been the recipient of two Star Schools awards, one for science education in New England in 1990, and the other for community organizations in Boston, Hartford, and New York in 1992.

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA developed an education program to build technological competence and leadership beginning in elementary and high school education. ANSA delivers a variety of science, math, and technology-related programs via satellite.

NII

NATIONAL INFORMATION INFRASTRUCTURE

Stimulated by Vice President Gore, the NII merged the nation's existing networks and communications devices into one interconnected, high-speed, broadband, interactive telecommunications and information "Superhighway". This initiative provides Americans with quick and easy access to information.

NTIA

NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

As part of the US Department of Commerce, NTIA acts as the President's principal advisor on telecommunication policies effecting the nation's economic and technological progress and industry regulation. With the Executive Branch, NTIA works toward the effective presentation of policy to the FCC, Congress and the public. NTIA maintains two funding programs: Public Television Facilities Program (PTFP) and the Telecommunications Information Infrastrucure Assistance Program (TIIAP).

NTU

NATIONAL TECHNOLOGICAL UNIVERSITY

NTU is a non-profit institution founded in 1984 and based in Fort Collins, CO. NTU includes 48 participating universities across the U.S. The member universities are connected by satellite telecommunication and compressed digital video. Fourteen master's degree programs in engineering and technology related areas are delivered via satellite each year. NTU does not, however, award bachelor's or doctorate degrees. NTU students are typically full-time employees of corporations or government agencies. During the 1996-97 academic year, 1,300 working professionals were admitted to NTU degree programs and enrollment in the Advanced Technology and Management Programs (ATMP) was more than 110,000.

PBS

PUBLIC BROADCAST SERVICE

The Public Broadcast Service (PBS), which operates the nation's public television network, funds and distributes instructional programs for adult learners and elementary and secondary students. Through its Adult Learning Service (ALS) and Adult Learning Satellite Service (ALSS), PBS offers telecourses to more than 1,800 colleges and universities through the cooperation of local public television stations. The PBS Elementary/Secondary Service (ESS) distributes instructional and professional development programs to K-12 schools throughout the country.

SERC

SATELLITE EDUCATIONAL RESOURCES CONSORTIUM

Located in Columbia, South Carolina, SERC is one of the original four Star Schools recipients. The consortium involves state Public Broadcast System entities and state Departments of Education in 25 participating states. SERC has offered satellite-delivered, interactive instruction and programming to schools in its partner and affiliate states. Additional Star Schools funding was provided to SERC in 1997 for the "Next Generation" development and distribution of materials via the Internet and CD-ROM.

SREB

SOUTHERN REGIONAL EDUCATION BOARD

The SREB, established in 1948 by Southern states, assists leaders in government and education to work cooperatively to advance education in the South. The SREB engages in a number of activities that include focusing on critical issues, implementing studies and analyzing data, and prompting debates that result in long term planning, implementation and policy. There are 15 partnering states including: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia. The SREB is funded by its partnering states and other for-profit and non-for profit organizations.

SREC

SOUTHERN REGIONAL ELECTRONIC CAMPUS

This organization allows students in the South to take courses at a large number of higher education institutions from their hometowns. Students are also able to select courses on the SREC web-site with the knowledge that the courses they will enroll in are of high quality.

STEP

SATELLITE TELECOMMUNICATIONS EDUCATIONAL PROGRAMMING

STEP is a system developed by Educational Service District (ESD) 101 in Spokane, Washington, to deliver live, interactive instruction via satellite. STEP now concentrates on delivering instruction to its partners in the Star Schools supported, five-state Pacific Northwest Partnership. The Partnership has been the recipient of multiple Star Schools awards in since 1990.

STEP-STAR NETWORK

Established in 1986, this organization provides classes to its members via satellite, cable, computers, and fiber optics. Content areas for students, teachers, and administrators include K-12, adult literacy, and course offered at the university level.

SLOAN FOUNDATION

ALFRED P. SLOAN FOUNDATION

Established in 1934, the Alfred P. Sloan Foundation has a great interest in science and technology. As a result of this interest, the Sloan Foundation has been involved with Asynchronous Learning Networks (ALN). Learning Outside the Classroom, one of the Sloan Foundation's programs, has generally focused on the effects of ALN in higher education in the areas of science and engineering. The Sloan Foundation is interested in having ALN proceed into real world applications. To do this, the Sloan Foundation has funded projects at universities and colleges nationwide. These projects are designed to study ALN and its outcomes. Future funding decisions will be based on the information gathered at these higher education institutions.

STAR SCHOOLS

The Star Schools Program was authorized in 1988 by the Stafford-Hawkins Act. The Department of Education oversees the program, which has awarded $62 million to eight multistate partnerships in its three cycles of awards. In addition to the partnerships, the 1992 cycle of Star Schools funding included dissemination grants and support for Iowa's statewide telecommunications network. Partnerships which have been funded are: (1988) Midlands Consortium, Satellite Educational Resources Consortium (SERC), Technical Education Research Centers (TERC), TI-IN; (1990) Black College Satellite Network (BCSN), Oklahoma State University (OSU)/Arts and Sciences Teleconferencing Service (ASTS), Satellite Telecommunications Educational Programming (STEP), Telecommunications Education for Advances in Mathematics and Science (TEAMS); and (1992) Great Lakes St. Lawrence Seaway Telecommunications Collaborative.

TEAMS

TEAMS, originating from the Los Angeles County Office of Education, is a unique Star Schools recipient in that it focuses on providing math and science programming for elementary school students. Students in grades four through six nationwide, and their teachers, receive TEAMS programming via satellite.

TECHNOLOGY LITERACY CHALLENGE FUND

President Clinton announced the Technology Literacy Challenge Fund in February 1996. The Technology Literacy Challenge Fund is a five-year, $2 billion program that is designed to ensure that all students are able to live and work in our technological society. The Fund provides grants to States to implement a statewide technology plan. Those involved in state education are encouraged to use the funding to obtain support from both public and private The Fund provides financial assistance to school systems for a wide range of activities to strengthen instruction through the use of technology.

USDLC

UNITED STAR DISTANCE LEARNING CONSORTIUM

Formerly TI-IN, the Consortium has received Star Schools funding since October 1994. The eight partnering institutions of the USDLC are the Education Service Center, the Florida State Department of Education, the Illinois State Department of Education, the New Mexico State Department of Education, the Public Schools of North Carolina, the Texas Education Agency, the TI-IN Network, and the Western Illinois University.

USDLA

UNITED STATES DISTANCE LEARNING ASSOCIATION

The USDLA promotes the development and application of distance learning through electronically mediated instruction including satellite, video, audiographic computer, and multimedia technologies. USDLA focuses on K-12 education, higher education, continuing education, and corporate training.

WESTERN COOPERATIVE FOR EDUCATIONAL TELECOMMUNICATIONS

Established in 1989 under the aegis of the Western Interstate Commission for Higher Education (WICHE), the Western Coop includes more than 145 universities, colleges, schools, and public agencies from 19 states, and private corporations from throughout the nation. The coop's missions include making information, resources, and expertise in telecommunications more readily available to its members. It is based in Boulder, Colorado.

GLOSSARY OF TERMS

ATM

ASYNCHRONOUS TRANSFER MODE

High-speed packet switching technique suitable for transmitting voice, data, and video over a digital line. It uses cell relay transmission.

BANDWIDTH

Refers to the capacity of a communications channel to carry information; the higher the bandwidth, the greater the amount of information that can be carried.

BRIDGE

A device, which is used to interconnect three or more telecommunications channels such as telephone lines, to permit simultaneous, two-way communication among all points which have been interconnected.

CHANNEL

A radio frequency assignment made according to the frequency band being used and the geographic location of the send/receive sites.

CODEC

A term used for a "encode/decode" electrical device that converts an analog electrical signal into a digital form for transmission purposes. It is used to transform video signals into digital form for transmission over digital transmission systems. Generally speaking, this digital information must be reconverted into analog form at the new reception point.

COMPRESSED VIDEO

Digital signals can be compressed by various methods to remove redundant information and save bandwidth. Only the changes in the moving frames are captured and transmitted.

COMPRESSION TECHNOLOGY

Technology using a codec to reduce bandwidth requirements.

DBS

DIGITAL BROADCAST SERVICE

Digitally compressed signals that enable one satellite transponder to broadcast many programs. A satellite dish positioned towards one orbital position can receive up to 200 channels with DBS. Five companies are currently offering DBS services.

DS-1

Digital signal level 1, a digital transmission format in which 24 voice channels are multiplexed into one 1.544 Mbps channel.

DS-3

Digital signal level 3; telephony term describing the 44 Mbps digital signal carried on a T3 facility.

DSU

DATA SERVICE UNIT

Simplified modem for the transmission of digital data over a private line, or for limited distance communications over the public switched telephone network (PSTN) where it is not necessary to comply with all the requirements for a high speed modem.

DATA RATE

The speed at which a channel carries data, measured in bits per second (bps).

DEDICATED LINE

A line rented from a telephone company for the exclusive use of a customer; also called a leased line.

DIGITAL

Information expressed in binary code; digital transmissions are by discrete signals (bits) rather than continuously variable analog waves. Digital processing and transmission allows for very high speed data communications, voice processing and compressed video. Digital technology allows signals to be compressed for more efficient transmission.

DOWNLINK

The path, or link, from the satellite to earth stations which receive its signals. The term is frequently applied to parabolic antenna that receives signals from a satellite. It is often referred to as: a dish, a terminal, an earth station, or a TVRO (television receive only).

FIBER OPTIC

Thin glass through which light beams transmit audio, video, and data signals.

FRAME RELAY

A method of transmitting a unit called a frame. The frame encapsulates data packets, which are transmitted in high-speed bursts across a digital network. A dedicated connection is required during transmission.

FREQUENCY

The rate at which an electromagnetic signal alternates. It is a term used with analog signals and is reported in Hertz.

FULL MOTION VIDEO

A standard video signal that can be transmitted by a variety of means including television broadcast, microwave, fiber optics, and satellite. Full-motion video traditionally requires 6 MHz in analog format and 45 Mbps when encoded digitally.

HERTZ

A unit of frequency equal to one cycle per second.

INTERNET

A matrix of networks that connects computers around the world.

ISDN

INTEGRATED SERVICES DIGITAL NETWORK

A fully digital communications facility designed to provide transparent end-to-end transmission of voice, data, video, and still image across the PSTN (Public Switched Telephone Network). Standards for this service are set by the CCITT. Access to the service is at one of two rates: the Basic Rate of 144 Kbps is provided as two B data channels of 64 Kbps and one D control channel of 16 Kbps; the second Primary Rate is SD1 or 2,048 Mbps in Europe and 1.544 Mbps in the U.S., Japan, and Canada, and is often referred to as 30B+D.

JPEG

JOINT PHOTOGRAPHIC EXPERTS GROUP

Still image compression standards developed by the combined efforts of the ISO and the TSS.

KBS

Stands for kilobits (1000 bits) per second. It is a way of reporting the rate of transmission of digital information per second.

LAN

LOCAL AREA NETWORK

Data communication networks that are fairly limited in their reach. For example, a company might be networked just within itself to share information between employees.

LATA

LOCAL ACCESS TRANSPORT AREA

The geographic area in which a local exchange carrier off long-distance services.

MPEG

MOVING PICTURES EXPERTS GROUP

Compression and motion video storage standards.

- MPEG-1: 240 lines x 360 pixels/line; digital transfer rates up to 1.5 Mbps; compression ratios of approximately 100:1
- MPEG-2: 720 lines x 480 pixels/line; used for HDTV and cable broadcasts

MICROWAVE

High frequency radio waves used for point-to-point communication of audio, video, and data signals. It requires line of sight transmission between sending and receiving antennas.

MULTIPLEXER

Equipment which allows for simultaneous communication of two or more messages on the same channel.

NETWORK

A set of points or locations which are connected by means of data, voice, and video communications for the purpose of exchanging information.

OC-3

OCCUPATIONS CHARACTER LEVEL

Digital transmission of 155 Mbps.

PACKET SWITCHING

The process of transmitting digital information by means of addressed packets which include data, call control signals, and error control information-so that a channel is occupied only during the transmission of the packet. In contrast, data sent using modems occupies a circuit for the entire duration of the transmission, even when no data is actually traveling over the lines. Using packet switching, the various packets of information can travel along different routes on the network, allowing the carrier to optimize its network capacity.

POTS

PLAIN OLD TELEPHONE SERVICE

Ordinary telephone lines.

SONET

SYNCHRONIZED OPTICAL NETWORK

A high-speed fiber optic transport network with transmission rates ranging from 51.84Mbps to 2.5Gbps.

SWITCHED NETWORK

A type of system where each user has a unique address (e.g., a phone number) which allows the network to connect any two points directly.

T-1

Digital carrier facility used to transmit a DS1 formatted digital signal at 1.544Mbps; the equivalent of 24 voice channels. It is the general term for a digital carrier available for high volume voice, data, or compressed video traffic. Fractional T-1 is half a T-1.

T-3

A 44.736 megabit T-carrier channel that can handle 672 voice or data channels at 64K bits/sec T-3 requires fiber optic cable. One T-3 channel can carry 28 T-1 channels.

TCP/IP

TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL

TCP is used to communicate HTTP requests, while IP routes packets of data on a network.

TELECOMMUNICATIONS

The use of wire, radio, optical, or other electromagnetic channels to transmit or receive signals for voice, data, and video communications.

TELECONFERENCING

Interactive electronic communication between two or more people at two or more sites which make use of voice, video, and/or data transmission systems: audio, audiographics, computer, and video systems. Teleconferencing capabilities range from two- to one-way transmission. Two-way teleconferencing enables the participants to interact with each other regardless of their geographic location. One-way teleconferencing allows only one party to communicate with the other participating locations.

TRANSPONDER

The designation that the carrier gives to the isolated frequency on a satellite. Most satellites have 24 transponders or channels.

UPLINK

The path, or link, from a transmitting earth station to the satellite. The term is frequently applied to a transmitting earth station.

WAN

WIDE AREA NETWORK

While LAN is restricted to the area within an enterprise, WAN is able to reach a larger geographic area. WANs allow digital communications to occur over switched or unswitched networks.

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